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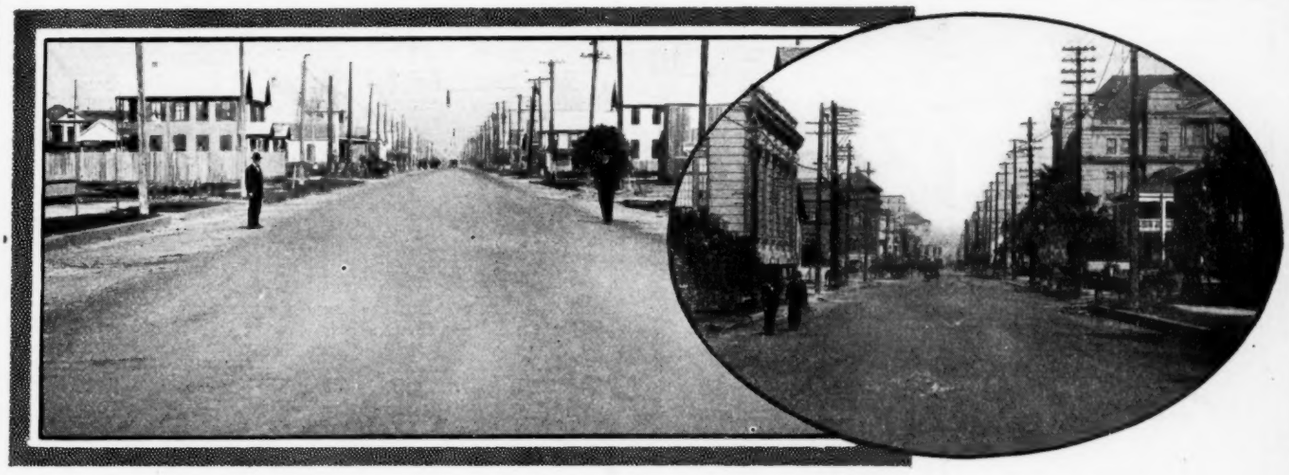

Views of the oyster-shell roads in Galveston, Tex., surface-treated in 1917 with "Tarvia-B" and "A." Above is shown 25th Street and Broadway. The view at right shows 20th Street, in the business section of the city.

Galveston's oyster-shell streets

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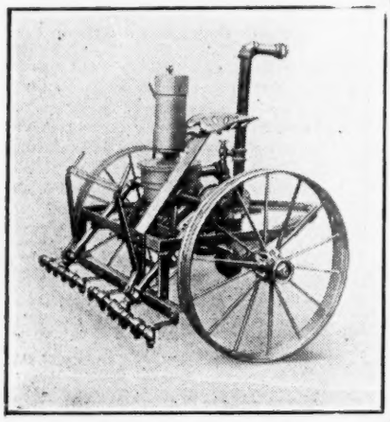

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City County State

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City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.

Information Bureau

The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

Contents of This Issue.

Editorial Notes..... 305
Returning to Normal Publication Conditions—Paving half-roads.

Pig Feeding for Disposal of Garbage (Illustrated)..... 306
The District of Columbia has been conducting an experimental pig farm, and from this experience and other data has drawn conclusions which are set forth by the assistant to the engineer commissioner, F. S. Besson.

Capacities of Small Septice Tanks..... 309
In view of the few data available for planning size of tanks, the standards fixed by the North Carolina Board of Health are of interest. The subject is discussed by S. E. Peters.

Building Zones for Newark (Illustrated)..... 310
Conclusion of article in last week's issue, giving regulations for area districts, rear yards, building lines and existing buildings. Also provisions for a Board of Appeals.

Painting Standpipes..... 312
Latter half of table on the subject, the first half of which appeared last week.

Prevention and Cure of "Red Water"..... 312
Practical plan, based on removel of free oxygen from water before it enters the piping of a building. By Wm. H. Walker.

News of the Societies..... 315

Personals..... 316

Contract News..... 13

RETURNING TO NORMAL PUBLICATION CONDITIONS.

We have already informed our readers concerning the strike by the New York printers which has caused delay in the publication of this journal. The strike, which began on October 1, ended on November 24, and the printing plants are rapidly getting back to normal conditions. During the period of the strike, some of the publications affected did not appear at all, while of many of the other weeklies only two or three issues were printed. A considerable number arranged to have the printing done in other cities, some only temporarily, but several permanently; while a few adopted expedients such as mimeographing the entire issue of photographing typewritten pages.

Municipal Journal & Public Works, unwilling to inconvenience its readers longer than was absolutely necessary, early made arrangements to have its issues printed and has published them in continuous order, although two or three weeks late; also with a difference of type, because the plant used during this period was not provided with the type regularly used by us. With this issue we renew publication under former conditions and will catch up with our publication date as soon as practicable—by the end of the year if it is possible to do so.

PAVING HALF-ROADS.

The vehicle-using public is becoming accustomed to detour signs, but that does not mean that they have become reconciled to these time-consuming, machine-wrecking, nerve-racking accompaniments of road construction and repair. If there is any possible way of overcoming this serious inconvenience it should be adopted. It is becoming even more serious, rather than less so, with the increasing use of concrete for pavements, which must stand closed to traffic for an additional week or two after the road has been closed for a similar period while grading and concrete construction was going on.

The only possible plan for avoiding detours that has been suggested, so far as we recall, is to construct and complete one half of a given stretch of road at a time, traffic, meanwhile, using the other side of the center line of the road. To this it is objected that this plan makes a joint and line of weakness in the center of the road; in spite of which, however, it has been followed in many cases.

We suggest that, in the case of roads where two lines of traffic are provided for by a width of 20 feet or more (which should include all durable-surface roads), there be no effort to bond the two halves into one continuously bonded whole, but that they be considered as two pave-

ments, separated from each other, traffic being expected to confine itself to its respective sides and not use the center. There might even be an advantage in setting a line of stone, concrete or brick, raised slightly above the surface, down the center line, the pavement on each side being constructed against this as a curb. Besides the greater convenience to traffic and in construction which this plan would afford, such a center curb, with a color different from that of the pavement, offers another advantage.

Marking a line down the center of a paved street or country road has a strong tendency to prevent automobile accidents. Such a line causes the drivers of cars to unconsciously keep on the right side of the road. Drivers of approaching vehicles have a stronger tendency to keep at a safe distance apart. The decided advantage of the center-line mark was first noticed on the Baltimore-Washington road, where the concrete surface was built one-half at a time, leaving a clearly defined line at the point of juncture. It was noticed that drivers almost universally kept to their own side of the road, whereas on unmarked roads, there was an almost universal tendency to drive in the center of the road and in approaching and passing vehicles the tendency was to allow the smallest margin of clearance possible. Chief engineer Mackall of the Maryland State Road Commission and C. M. Upham, state highway engineer of Delaware, both plan, after observing results on the Maryland road, to paint a black line down the center of their paved state roads.

If it is an advantage to endeavor to persuade drivers to use the two halves of the road as two separate roadways, why inconvenience the public by building them both at once, or increase cost and maintenance troubles by trying to join them into one structural whole, with the joint imperceptible? A line of white stone or concrete down the center of a bituminous road, or of red brick in a concrete road, would furnish a permanent, ineradicable line; and in the case of concrete pavement would provide opportunity for two expansion joints and take the place of the irregular, unsightly crack that is found following the center of so many roads made of this material.

PIG FEEDING FOR DISPOSAL OF GARBAGE

Results Obtained at Experimental Farm Operated by the District of Columbia, and Conclusions Therefrom —Selection of Stock—Protection from Disease—Housing and Feeding—Costs and Profits.

By F. S. BESSON,*

There have been rumors during the past few years of fabulous sums made in garbage feeding operations. Therefore, when city garbage collections showed signs of becoming an overload for the District of Columbia reduction plant, the opportunity was grasped to get rid of some of the surplus by feeding and at the same time learn something about this relatively new development in the field of garbage disposal.

Two hundred pigs were purchased, and the detail of Dr. B. T. Woodward, a specialist, was fortunately obtained from the United States Department of Agriculture to supervise operations at the experimental farm. Under his guidance, inspections were made of stockyards and a number of existing feeding enterprises. From the experimental farm data and as a result of these inspections, certain deductions were made and conclusions reached, which are herein set forth.

First of all in garbage feeding, it is necessary to determine the source of supply of the pigs and the contingent elements which so much affect their profitable use as feeders. There is a rather set opinion that garbage bred stock is essential to a successful feeding establishment and that ordinary farm stock is subject to digestive disorders when transferred to a garbage ration. It has been maintained that successful feeders can be developed only after generations of breeding from garbage fed stock.

If these conditions were true, the difficulties would be such as to preclude pig feeding for the disposal of the garbage collections from a city the size of Washington, requiring a turnover of from 10,000 to 12,000 pigs three times annually.

City garbage feeding must be recognized as a business entirely distinct from pig breeding. This does not mean that a garbage farm might not raise some of its own feeders, but if so, the breeding farm should be separate from that used for garbage feeding, and operated in accordance with the well established rules of pig management without the interjection of those relative to garbage feeding.

The most favorable procedure is to purchase pigs for feeding purposes just after they have passed the 100 lb. stage. All the difficulties of raising small pigs and the attendant high mortalities are thus avoided. The pigs should be fed until they have slightly more than doubled their weight. From the 100 lb. stage to the 225 lb. stage is the most rapid and profitable fattening period of a pig's existence, and the latter weight brings the top market price per pound. A few isolated cases of pregnancy may come to light shortly after purchasing the feeders. If there are not facilities for raising the baby pigs separately from the garbage establishment, the best plan is to kill them as soon as born.

A source of supply for the feeders may be developed among the farmers in the immediate territory surrounding a city, but it is felt that real dependence must be placed upon stock yards. There are sufficient yards in this country within feasible shipping distance of our cities to afford wide latitude in selecting pigs, which may be of various breeds, but their general conformation should be favorable to rapid gains in weight under heavy feeding.

*Captain, Corps of Engineers, U. S. A. Assistant to Engineer Commissioner, District of Columbia.

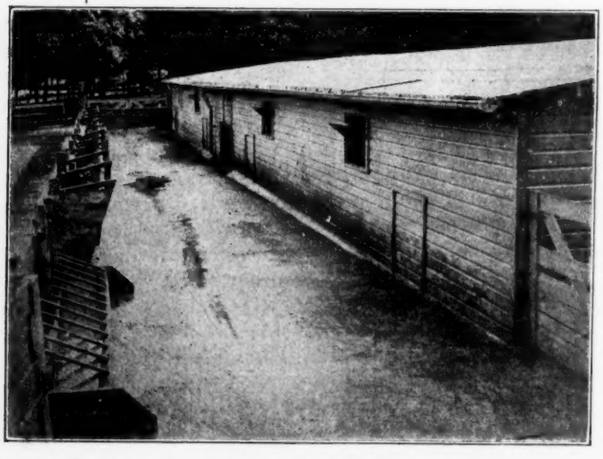


FIG. 1—GARBAGE IN THE SELF-FEEDER EARLY IN THE MORNING PREPARATORY TO TURNING THE PIGS ONTO THE CONCRETE PLATFORM.

They should be well set up, with plenty of bone as a support for the flesh that is to be piled on.

In stock yards, the feeders are handled under the rigid supervision of the Bureau of Animal Industry of the Federal Government. It is to the credit of this bureau that that bugbear of the farmer, hog cholera, may be absolutely held under control. At the stock yards, pigs are given hog cholera virus and serum in the simultaneous method of inoculation under the supervision of the bureau's veterinary inspectors. With this treatment, it can be reliably stated that no more trouble from this disease need be expected than from smallpox among persons who have been successfully vaccinated against that dread plague.

Since all stock yards are cholera infected, pigs held without treatment are found, in a few days, to have the disease in its incipient stage. Therefore, the bureau inspectors refuse to supervise the immunization of animals that have been held for more than five days. The bureau also discourages the shipment of animals from one public stockyard to another for purposes other than slaughter. A contractor in the feeding business should be cautious in this respect and patronize those commission merchants who will sell him pigs direct from the farm.

Shipments should be made promptly after immunization or should be delayed for not less than ten days. Truck hauls and shipments not exceeding 36 hours in length can be promptly made to advantage. Little or no feed is necessary during the 24 hours following inoculation, but clean water must be accessible at all times. The pigs purchased for the experimental farm were held at the stock yards ten days at the risk of the commission merchant, for which a charge of one cent per pound was made. During this period the only feed furnished was soaked oats in self feeders and in separate ones a protein concentrate. Upon arrival at the farm, the pigs under short rations were gradually accommodated to garbage feeding.

At the same time as the pigs receive cholera inoculation they should be given serum to make them resistant to hemorrhagic septicemia, known commonly as swine plague. The control of this disease is not definite as is that of hog cholera. With the latter under certain control, swine plague becomes one of the elements demanding most attention in the design of the feeding establishment, in order that conditions surrounding the pigs may be conducive to the prevention and eradication of the disease.

Hemorrhagic septicemia is an infectious disease, attended with a very high mortality. It usually appears as a form of pneumonia, the infectious outbreak of which is caused by an organism that is often found in the soil, upon various plants, and even in the noses and throats of healthy swine, as harmless bacilli which become virulent after passing through diseased animals. The spread of the disease seems to depend nearly as much upon the condition and susceptibility of the animal as upon the contagious nature of the disease. It is well to use bacterial vaccine as a preventative and to keep a supply on hand for use in protecting the unaffected portion of the herd in case of an outbreak, but in addition it is essential to give minute attention to maintaining living and feeding conditions favorable to the prevention of the outbreak.

The breeding or feed of a pig cannot cause either hog cholera or swine plague, but bad methods may so weaken the constitution and vitality that the animal becomes more susceptible to them than would otherwise be the case. Scrupulous cleanliness is necessary for a successful feeding establishment. Contrary to common belief, pigs have some habits which raise them above other domestic animals from the standpoint of cleanliness. The animals must be kept dry, and wallows are absolutely unnecessary on a garbage feeding farm. Wet, muddy, or damp conditions are sure to lead to some form of pneumonia.

At one farm, during the raging of swine plague thereon, it was found that the pigs practically had to swim in order to pass from their houses to their feeding platforms. To reach their drinking troughs, they had to wade through mud up to their bellies. Similar conditions are invariably found at farms where pigs are permitted access to streams for drinking purposes. Bad feeding arrangements are too often prevalent. Animals are compelled to root their food out of mud or accumulations of refuse left from previous days' feedings. When platforms are used they are often placed so that the pigs have to crawl over each other and continually fight in order to get their food. Aside from the fact that the conditions enumerated are conducive to disease, the principal aim of a feeding enterprise is defeated, and that is —fatten the stock for market in the shortest possible time.

It is surprising on what small acreage this aim can be accomplished. During the short life of a hundred days or so at the feeding farm, exercise for the pigs further than that accomplished in the acts of eating and drinking is unnecessary. Fifty square feet per animal is an abundance of room for an open yard, with eight square feet for housing and an equal area for feeding. These areas are maximum ones. The three photographs herewith give a good idea of the arrangements at the experimental farm. The complete installation, not counting the cost of the land, was $8.00 per pig.

The photographs show some details worthy of noting. The house is built between the yard and the concrete feeding platform. The pigs are not permitted direct access to the latter from the house, but only by way of concrete pathways at either end of the house and through its middle. The tracking of garbage into the house is thus prevented. These pathways also prevent the tracking of soil from the yard onto the feeding platform. Each morning the pigs are shut off the platform. A truck is then driven in and the refuse from the previous day's feed shoveled off, and the platform scrubbed clean. The self-feeders are filled with garbage and the pigs turned in with enough food before them to satisfy them not only for the day, but also for the night.

On the average it takes from 20 to 25 lbs. of garbage consumed per pig per day to add one pound of flesh per day, which gain is attainable in a successful establishment. In winter, during the period of rich garbage, about

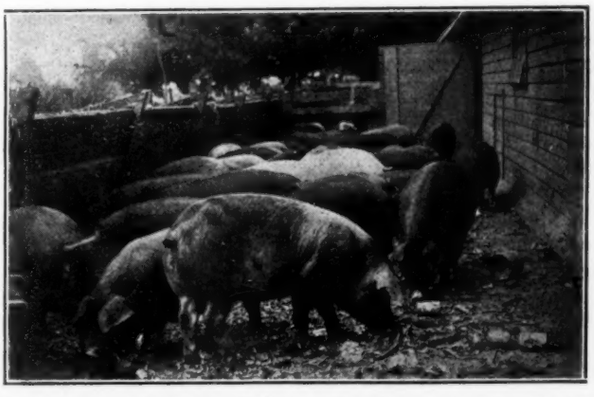


FIG. 2—LATE IN THE DAY; GARBAGE WELL CULLED OVER AND NON-EDIBLE REFUSE APPARENT.

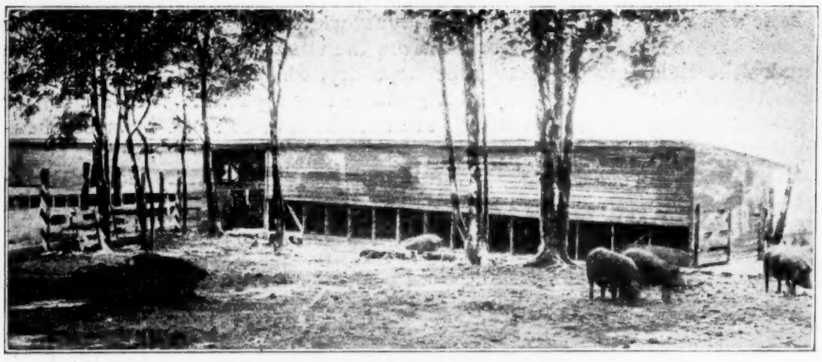


FIG. 3—YARD IN REAR OF HOUSE, EXPERIMENTAL FARM.

15 to 20 lbs. of the feed per pig is refuse and is not consumed, and must be daily cleaned from the platform. In summer this is increased to about 30 lbs. per pig, due to the presence of a large amount of watermelon rinds, corn cobs and other similar remains of fruits and vegetables not eaten by the pigs. The refuse from garbage feeding has a high value as a fertilizer. Naturally, these figures and the value of the refuse fertilizer are dependent upon the degree of separation enforced upon the householders by the municipality. If the exclusion of tin cans, bottles and other trash is not enforced, the refuse may be of outrageous proportions.

The use of a self-feeder permits water and juices to drain from the garbage rapidly. It is the cleanest method of feeding, and holds the amount of refuse to a minimum. Some difficulties are presented in winter in northern latitudes, due to the garbage freezing and sticking in the feeder. It was early found that, with the opening at the floor level, the pigs had to work too hard to get the garbage out of the feeder. Self-feeders for garbage should be built on a curb, so that the feeding opening is about 8 inches above the floor level.

Pigs may be fed directly from concrete platforms. These must be given rapid slope to grease traps connected with drain pipes, in order to get rid of the sloppy water in the garbage. Dump trucks driving in on the platforms deliver their loads direct, with a minimum of labor, but the refuse collected after feeding is increased materially over that in the feeder method, due to tramping by the pigs. This means food is paid for and wasted, and the labor of carting off the refuse is increased. Nevertheless, platform feeding has its advantages under some conditions.

It may be noted that the assumption in the above is that raw garbage is to be fed. It is difficult to justify the cooking or sterilizing of garbage. Practical data do not show that good is done thereby and, aside from the expense entailed, harm is done the pigs. In theory, profit can be made by the reclamation of grease from cooked garbage prior to feeding, but in practice failure has resulted. Opinion is current that the feeding of raw garbage leads to soft pork. To the contrary the experimental farm pigs sold above market prices, and their dressed weight was 81 per cent of their live weight, which is well above the average of farm bred pork.

A sloppy mess floated down to pigs is not only intrinsically bad, but also it defeats the practice of selective feeding. Onions, pickles, tomatoes and many other substances are eaten, as in the case of cooked garbage, only when there is no other recourse. The craving of the pigs' appetites must not only be satisfied as to the amount of food, but also as to the kind. The marked success of the self feeding system of pig raising is largely due to the fact that they can eat an abundance of those feeds which nourish them to the best advantage. Pigs are naturally self-fed animals, and raw garbage affords them opportunity to follow their natural instincts.

Returning to the photographs, at each end of the feeding platform is drinking water, easily available while the pigs are eating. The slats over the trough are nailed to the fence in the rear, about a foot over the trough. Thus, or by the use of the slats in an "A" frame, the pigs are prevented from lying on top of the trough. A drink cannot be obtained if a pig puts as much as his front feet in the water. Filth is not permitted to accumulate in the bottom of the troughs. The water is kept fresh by automatic overflows. Of course, water troughs are also provided in the yard, special attention being paid to drainage, in order that the ground around the troughs may be kept dry.

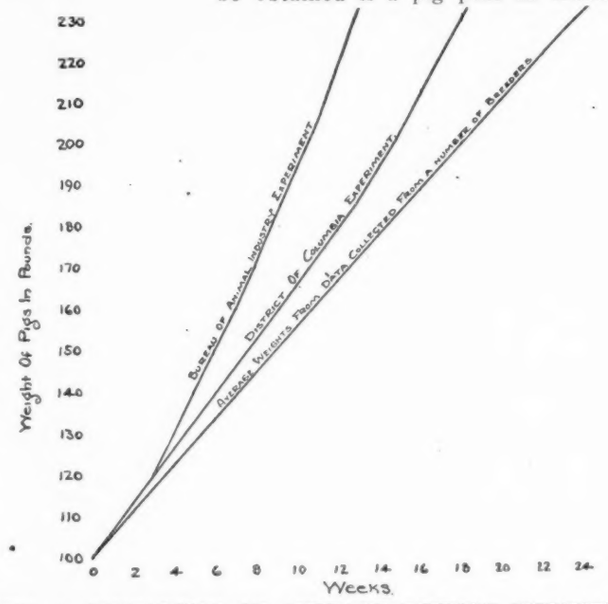


FIG. 4—COMPARISON OF AVERAGE WEEKLY WEIGHTS OF PIGS AT EXPERIMENTAL FARM WITH SIMILAR WEIGHTS OF 121 AT THE BUREAU OF ANIMAL INDUSTRY FARM AND THOSE OF A NUMBER OF STOCK BREEDERS.

The house is constructed with a tight floor in order that cold draughts from below will not be conducive to pneumonia among the pigs. The roof is high enough to permit a man to stand erect while cleaning. It is remarkable how many pig houses are not so constructed, notwithstanding the detriment to cleanliness constituted by the failure to do so. The cleanings from the floor of the house are shoveled through small doors opening upon the feeding platform and hauled away with the refuse from the garbage. A thin layer of sand is usually kept on the board floor of the house. To the credit of the pigs, it is stated that the house needs but occasional cleaning, as they go outside to deposit their excreta.

The droppings in the yard are raked up daily. It is found that these amount to six pounds per pig per day, which exceeds by several pounds the excreta from pigs not fed on garbage, as determined by the Bureau of Animal Industry. These droppings have a very high value as a fertilizer. The consistency of the droppings is closely watched, as thereby is afforded an indication of the physi-

cal condition of the pigs. When necessary, epsom salts is mixed with their drinking water.

Ordinarily, this is all the medical attention pigs need while at the feeding farm. In cases of individual sick pigs, short rations, a laxative and the use of the isolated quarantine pen will suffice. As stated heretofore, a supply of hemorrhagic septicemia vaccine should be kept so that it will be right at hand if your veterinarian decides that the appearance of a disease in which a number of hogs are similarly affected calls for its use.

At the experimental farm, of the 200 pigs purchased, eight died, all during the first thirty days. Seven died from swine plague and one from a poisoned cut from a tin can. The shipping weight of the pigs for the experimental farm was 21,095 pounds. The receiving weight was 20,053 pounds. The selling weight after an average of 136 days was 46,405 pounds. This gives a gain over the receiving weight of 26,352 pounds, or of 1.06 pounds per pig per day. Figure 4 shows the average weekly weights of the pigs that were sold, as compared with similar weights of 121 at the Bureau of Animal Industry Farm, Beltsville, Maryland. These latter were carefully fed in order to fatten them for market and the results are above those obtained by a number of practical breeders, according to data collected by the bureau.

There are certain definite expenses connected with a garbage feeding enterprise that must be taken cognizance of. With relatively close approximation, these may be stated as follows:

$2.00 per pig immunization and dipping.
$1.00 per pig quarantine at commission merchant's risk.
$1.50 per pig freight and shipping costs.
$ .50 per pig medical care.

Other charges should be fixed definitely by the conditions of the contract. It is important that the garbage supply should not be subject to erratic fluctuations, which will be the case if the municipality permits private piggeries flourishing on the outskirts to promiscuously collect garbage throughout the city. Under such conditions the public contractor loses the cream of the collections. The terms of the contract should provide for the supply of all the city garbage, and as stated heretofore, proper separation must be enforced.

The least time for which a contract should be entered into is three years, and five years is a more favorable term. Upon this depends the cost for maintenance and amortization of structures and farm equipment, which should not exceed one dollar per pig. Also, it is necessary that a contract run a number of years in order that sales on a falling market may be compensated by those on a rising market. The amount bid per ton for garbage delivered at the farm may vary from three to eight times the price per pound of live killing hogs on the Chicago market. The bid would depend greatly upon the city in question. For instance, the inhabitants of some cities are great fish eaters, and the garbage therefrom has little value from a pig feeding standpoint. In some cities separation is poorly enforced and the garbage is correspondingly poor in quality.

With an average bid of five times the price of live killing hogs and a supposititious price of 15 cents per pound, garbage costs the contractor 75 cents per ton. On a basis of three tons of garbage for each pig during its life at the farm, the cost for feed is $2.25 per pig. Adding this to previously enumerated fixed costs, with a labor allowance of $1.50 per pig, gives a total of $9.75 per pig.

The pigs gain an average of 120 pounds, worth, at 15 cents per pound, $18.00. The difference between the selling price and the fixed costs, or $8.25 per pig, covers incidentals, overhead and profits. Management determines whether or not incidentals, represented largely by hemorraghic septicemia, eat up the profits. Under fair management, pigs, with a turnover three times annually, may well compete with reduction processes in the disposal of city garbage.

CAPACITIES OF SMALL SEPTIC TANKS.

Few Data Available for Designing Sizes—Standards of Capacities Fixed by North Carolina Board of Health.

By S. E. PETERS.

It is surprising how little definite information concerning the capacities of small septic tanks is revealed by a search through the various books covering the subject of sewage treatment, or through the files of the engineering periodicals. Either there is a real and definite lack of data, or else the idea seems to prevail that an installation too small for computation along regular lines of sewage flow is too small for consideration.

There are, in an installation of this kind, such enormously complicating factors that set rules of design are almost worthless. Sizes of families, and of individuals in families; number of bathroom fixtures; and availability and amount of water, are but a few of these reasons. No attempt will be made in this article to lay down any such set rules, but from the data given below, information to fit various cases may be selected.

The various state boards of health are surprisingly vague (excepting North Carolina, of which more will be said later), and a search of their requirements gives little real information. Metcalf and Eddy, in Volume III of their work on Sewerage, state that Fletcher, at Sugar Hill, N. H., allowed 20 gallons per person daily, but give practically no other information on this particular subject; nor in Folwell's "Sewerage" is much additional information to be found.

The latest requirements of the various states show that Wisconsin requires, where there is a water carriage system, 4 cubic feet of tank capacity per person contributing to the tank. On a 24-hour retention basis, as a standard, this means 30 gallons capacity per person. Ohio calls for 560 gallons for four to ten persons and 50 gallons per person for all others, though in another publication of about the same date, 50 gallons per person, straight, is required. Kentucky requires not less than 24 nor more than 48 hours' retention period, leaving the question of capacity to the individual. For single houses, the tank is limited in size to not more than 5 feet in depth or width.

In Texas, a retention period of 24 hours is specified. Illinois also requires a retention period of 24 hours, and fixes the basis of design as 45 gallons per person. Warren, in a publication of the Department of Agriculture, states that 24 hours' retention capacity is necessary, with an additional allowance of 25 per cent for sludge. He estimates the average use of water, with a good water supply, to be 40 gallons per capita.

It should be noted at this point that a septic tank is one fed by a water-carriage system of sewerage. The small privy installation employing the septic principle, to which the necessary water is added by buckets or similar device, is defined as the septic privy. Not one of the above laws make any specific reference to this type of installation, excepting possibly Kentucky, though it is a numerous and, from a sanitary standpoint, important one.

The intending purchaser of a small septic tank or privy installation is practically obliged to follow one of three courses. He may consult an engineer; he may place himself in the hands of a manufacturer of the commercial types of the septic privy; or he may go out and get a plumber, a carpenter or an ex-concrete foreman temporarily out of a job, or maybe a bridge builder, to design and build him one. If he does the first or the second, he will usually get a good job; the last may be classed as a very poor risk.

The inherent ability of this type of installation to work under adverse conditions will sometimes come to the rescue of the pseudo-engineer; but too often the reverse is true. The writer has in mind a place where the local carpenter put in a tank 6 feet long, 4 feet deep and 4 feet wide to care for the sewage from a hotel normally accommodating 150 people, and in rush times caring for 250. But the straw that broke the camel's back was the fact that the baffle was unfortunately placed upside down.

Some three or four firms now manufacture septic tanks and septic privies, mainly of concrete, but also of steel. On the whole, these firms turn out a product of a very high class, and stand behind their product. While the tanks they produce, as a rule, operate very well, there is not uniformity in the capacities of the competing companies, each, till very recently, installing such sizes as seemed to them suited to the work or the money available.

The first real step toward standardizing the capacities of septic tanks and septic privies for homes, mills, schools and the like has been made by the North Carolina State Board of Health. This action was the natural result of a law passed recently in that state requiring the installation of sanitary privies throughout the state, under regulations to be issued by the State Board of Health. These regulations, as issued, specified with a considerable degree of refinement, the sizes of septic tanks and septic privies for various conditions. Methods of disposal, kind and sizes of secondary treatment, and similar details are also included.

For schools, a capacity of 15 gallons per capita in septic tanks, with a minimum size of 500 gallons, is required. The length of drain tile for sub-surface irrigation is not specified other than "to be sufficient to dispose of entire effluent, depending on soil conditions." The effluent may be discharged directly into running streams not tributary to a water supply, and where no nuisance will be caused. When sand filters are used, the plant must be equipped with two alternating siphons and have two sand filters, each with 3¼ square feet of area per capita.

Septic tanks for mills and similar industrial requirements, if having baths, must have 25 gallons capacity per person, up to 20 operatives, and 20 gallons per person above that number. Where there are no baths, 20 gallons is required up to 20 persons and 15 gallons each for more. The minimum under this ruling is 400 gallons. For such industrial installations, 7½ square feet of sand filter area must be provided on each sand bed.

Septic tanks for homes must have a minimum capacity of 200 gallons, with a length of drain tile of 200 feet. This minimum requirement is subject to the necessity of providing 30 gallons per capita up to 25 people and 20 gallons per capita above that number.

Septic privies (no water carriage system), when used in schools, must have 100 gallons capacity in the sludge chamber and 45 gallons in the effluent chamber, for 15 pupils, with 20 feet of drain tile. For 15 to 30 pupils, the sludge chamber must be of 175 gallons, the effluent chamber of 50 gallons and the tile length of 40 feet. For 30 to 45 pupils, 250 gallons and 55 gallons, respectively, with 50 feet of tile, are required. For more than 45 pupils, 50 gallons of sludge storage capacity is added, with corresponding increases in effluent chamber size and tile length, for each unit of 15 pupils.

For mills and similar industrial installations, the same schedule may be used, replacing each group of 15 pupils with a unit of 8 operatives.

BUILDING ZONES FOR NEWARK.*

Regulations for Area Districts—Rear Yards—Building Lines—Regulating Existing Buildings —Board of Appeals.

AREA DISTRICTS.

In approaching the formulation of the area regulations, the attempt has been made not to impose more stringent provisions relating to the size of courts and yards or the percentage of the lot that may be covered by different types of buildings than is now generally the rule, but to set aside districts in which each type may be erected substantially in the same manner as at present without fear of molestation by types injurious to it.

In other words, the factory loft, the warehouse, the office building, the store, the tenement, and the private dwelling may be erected in the future the same as in the past. There will be this difference, however—that the buildings erected in any particular district will all have to conform to certain minimum standards of open space, factories occupying nearly all of the lot will not be allowed to exploit sections developed with apartment houses covering only seventy per cent of the lot, and apartments will in their turn be prohibited from stealing the light and air of districts improved with dwellings utilizing but a quarter of the lot. The factory as such, however, if it is a factory the erection of which should be allowed, will be permitted to be built substantially as at present provided it is put up in a district occupied by similar buildings. The same is true of the warehouse, the office building, the store, and the tenement; for it has been our aim, not to establish new standards of open space for buildings, but to lay out districts in which buildings conforming to any particular standard may be protected against buildings conforming to an inferior standard.

Regulations in the Several Area Districts.—Four classes of area districts are proposed for Newark—A, B, C, and D districts. In each of these districts the size of the courts and yards required is made to vary with the height of the building.

The A districts are designed especially for business and factory buildings requiring outside light and ventilation. Residential buildings erected in A districts are obliged to conform to the regulations prescribed for the B districts. A building situated on a corner lot may occupy the entire lot, but no building on an interior lot is allowed to occupy more than ninety per cent of the lot above the sill level of the second story windows or more than twenty feet above the curb level. Business buildings which do not require any outside light or ventilation, like storage warehouses, coal pockets, grain elevators, etc., may, however, occupy the entire lot even though situated on interior lots.

The ordinance does not stipulate what kind of open spaces must be provided; it simply states that every room in which persons live, sleep, work or congregate shall have at least one window or skylight opening directly either upon a street or upon a rear yard, side yard, outer court or inner court conforming to certain minimum dimensions in proportion to the height of the building.

The B districts were worked out with particular reference to apartment buildings. The regulations were designed to fit into the provisions of the tenement house law. Seventy per cent of the lot may be covered in the case of interior lots; ninety per cent in the case of corner lots. The chief effect of the B district regulations will be to compel

*Concluded from page 292.

all buildings located in tenement house districts to provide courts and yards of approximately the same size as those required for tenement houses.

The C districts are set aside for detached houses on small lots, group houses and apartments occupying a smaller percentage of the lot than that allowed by the tenement house law. In the C districts, buildings are limited to sixty per cent of the area of interior lots; seventy per cent of the area of corner lots. The courts and yards required are also larger than those demanded in the B districts. Yet they are elaborated in such a manner as not to discriminate against the three-family detached houses of which there is such a great number in Newark.

The D districts were constituted to afford the maximum protection thought possible within our constitutional limitations to such private house districts as Weequahic Park, Clinton Hill, and Forest Hill. Apartments are not excluded in the D districts, but if they are erected they will have to conform to the same area regulations as private houses. These provisions, it is thought, are so severe as to make it uneconomic to erec large multi-family houses. Buildings on interior lots may not occupy more than thirty-five per cent of the lot area; on corner lots not more than forty-five per cent of the lot area. They must also be equipped with at least one side yard.

Rear Yards.—Stores and business buildings erected on streets other than residence streets may occupy the entire lot up to the second story sill level or to a height of twenty feet above the curb level, no matter what the area district they are in may happen to be. The requirements of a store are the same in an apartment house district as in a detached house district and in both instances the legal provisions should be such as to permit it to occupy the entire ground area with the first floor. But above the ground floor the situation is different. On most local business streets it will be found that the upper floors are used for residential purposes, as they are not profitable for business purposes. The regulations for local business streets beginning at the second floor are, therefore, the same as for residence streets.

All buildings situated on interior lots are required to provide rear yards in the several area districts, except the A districts, where the rear lot line is more than fifty-five feet back from the nearest street. Corner lots not more than fifty feet wide may be improved in any district without providing a rear yard.

To insist on the provision of a rear yard in the A districts would seriously hamper the erection of efficient business buildings in the downtown section where the block unit is often not more than two hundred feet wide. With such shallow blocks it is of course absolutely necessary to permit buildings to run through the block from street to street, as it would be impracticable to limit the depth of large stores, theatres, and office buildings to one hundred feet. When this concession is made to through buildings, there is little object in requiring all buildings that do not run through the block to be equipped with rear yards. Rear yards provided on isolated lots scattered here and there through the block between through buildings do not help the ventilation in the block any more than inner courts.

In elaborating the area regulations for Newark, it therefore seemed reasonable to omit the rear yard requirement for the A districts. Yet it was felt that a deep building with three dead walls, obtaining all its light and air from but one side, is a bad building. Daylight and ventilation other than that coming through the front windows must be provided to have a satisfactory building. Under the regulations proposed for Newark, this result will be accomplished by the provision which limits the maximum area that may be occupied by interior buildings to ninety per cent of the lot. The space left open will undoubtedly very often be located on the rear of the lot, but it need not be located there, for the builder may, as he sees fit, elect either an inner court, an outer court, or side yard.

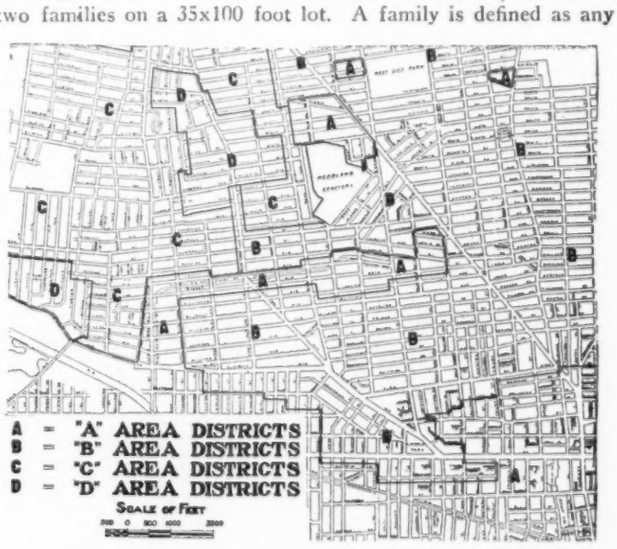
Building Lines.—In the past the freedom enjoyed by every owner to erect his building on the street line has seriously prejudiced the highest residential development of many streets. There is probably nothing that enhances the attractiveness of a street with private homes more than an open strip of ground between the street line and the building line. Setting back the houses permits the maintenance of a front lawn with grass and trees; it shuts out the dust and noise of the street; it promotes family privacy; and it affords additional light and air. And yet, in the absence of any obligation binding all the owners within a block to observe a minimum setback line, each owner has felt it necessary to build his house on the street line. His own self-protection has demanded this. If he did not erect his house on the sidewalk, his neighbors on either side might. Being pocketed between two buildings, his house, instead of facing a street, would really front upon an outer court. Countless owners, trusting to the comity of their neighbors, have had their values ruined by themselves observing the amenities of the district.

If we wish to preserve the front yards in our residence districts we cannot permit a situation to continue which rewards the despoiler and blackjacks the benefactor of a neighborhood. A method must be found to protect the house that conforms to a minimum setback line. The proposed ordinance suggests such a method which, though it may not be ideal, still affords a considerable degree of protection to houses in the C and D districts.

The proposition is briefly this: Where at least one-half of the buildings situated on either side of a street between two intersecting streets conform to a minimum setback, no new building may be erected to project beyond it unless an open space is left on each side of the building beyond the setback. Each of these open spaces is required to have a minimum width at every point beyond the setback equal to a least one per cent of the width of the lot on which the building is situated for each one per cent that the building projects beyond the setback.

The effect of this provision would be absolutely to prohibit any new building in a block where half the existing buildings observe a minimum setback line from projecting beyond half the distance to the street or from occupying more than one-quarter of the area between the setback line and the street line. In actual practice, however, it is doubtful whether any building would ever project more than one-quarter of the distance to the street.

Congestion of Population.—The commission recommends that no dwelling or tenement house hereafter erected shall accommodate or make provision for more than a given number of families. The number in any particular case varies according to the district and the size of the lot. Thus in the A and B districts the limit expressed on an acreage basis is 140 families; in the C districts 105 families; and in the D districts 25 families. This is equivalent in the A and B districts to eight families on a 25x100 foot lot; in the C districts to six families. In the D districts it is equivalent to two families on a 35x100 foot lot. A family is defined as any



AREA DISTRICT MAP OF A SECTION OF NEWARK.

number of individuals living and cooking together on the premises as a single housekeeping unit.

Experience shows that, in the absence of any restriction on congestion, there is practically no limit to the population that will house itself on a given area of ground. Tenements now being erected in New York accommodate more persons per acre than any of the old slums. In 1914 the average tenement density was 852 in Manhattan and 697 in Brooklyn, with a maximum of 1600. (Streets are not included in the area.) And the maximum is rapidly becoming the average.

The relatively small amount of open space per family provided in extreme cases of overcrowding has not received the serious consideration that it deserves. Where a one-family house occupies 25 per cent of a 50x100 lot there is 3750 square feet of vacant space per family; where a six-story, thirty-family tenement occupies 70 per cent of the lot, the vacant space is 50 square feet per family. Under the regulations proposed for Newark, each family on an interior lot in the A and B districts would have 94 square feet, 166 square feet in the C districts, and 610 square feet in the D districts. Applying height, area and congestion limits to the areas proposed for residential purpose, two million people could be housed within the present area of Newark.

OTHER PROVISIONS.

The proposed ordinance is not retroactive. Any building or premises may continue in its present use undisturbed. But next to controlling the erection of new buildings, nothing is more important in zoning than to regulate the use of old ones. The latter is as necessary as the former to protect "spotted" districts against steady deterioration.

The regulations controlling non-conforming buildings and uses (except as modified in a specific case by the board of appeals) are in brief as follows:

1. The structural alterations made in such buildings shall not exceed fifty per cent of their assessed value, nor shall the building be enlarged, unless the use is changed to a conforming use.

2. No non-conforming use shall be extended at the expense of a conforming use.

3. In a residence district no building or premises devoted to a use permitted in a business district shall be changed into a use excluded from a business district.

4. In a residence or business district no building or premises devoted to a use permitted in an industrial district shall be changed into a use excluded from an industrial district.

5. In a residence, business or industrial district no building or premises devoted to a use excluded from an industrial district shall be structurally altered if its use shall have been changed since the passage of the ordinance to another use also excluded from an industrial district. On the other hand, no building in either of these three districts devoted to a use excluded from an industrial district shall have its use changed to another use which is also excluded from an industrial district if the building shall have been structurally altered since the passage of the ordinance. A change of use for both of the above cases is defined as a change from one offensive trade to another offensive trade, as for instance, from a dyeing establishment to a fertilizer plant.

Board of Appeals.—Provision is made for a board of appeals "to administer the proposed ordinance so as to obviate unnecessary hardship in exceptional cases". This board consists of the superintendent of buildings, the chief engineer, the health officer, the inspector of combustibles, and the president of the tax board.

The authority vested in the board is to be exercised only after public notice and hearing. The property owners in the vicinity of the parcel which is the object of an appeal will in each instance be notified to attend the hearing and present such objections as they may have against the application. If the board is moved by the objection, it may either refuse to grant the appeal or grant it subject to such conditions and safeguards as will meet the objections urged by the neighboring property owners. The board may entertain only such appeals as the proposed ordinance vests in its jurisdiction, and no appeal granted establishes a precedent—each appeal is to be judged on its own merits.

The principal variations which the board may make in specific cases are as follows:

1. Where a use district boundary line divides a lot in a single ownership at the time the ordinance is passed, the board may permit a use authorized on either portion of the lot to extend to the entire lot, but not more than twenty-five feet beyond the boundary line of the district in which the use is authorized.

2. The board may permit the extension of a non-conforming use or building upon a lot so occupied at the time the ordinance is passed.

3. The board may permit an additional building to be erected upon a lot occupied at the time this ordinance is passed by an industrial establishment provided such additional building is to be a part of the present establishment.

4. The board may permit in a business district the construction, extension, alteration or conversion of a building intended for the storage of motor vehicles.

5. The board may in undeveloped sections of the city grant temporary and conditional permits for a period of not more than two years for structures and uses in contravention of the use district regulations of the ordinance.

6. The board may waive the requirement of a building line either in whole or in part in instances where its provision would cause unnecessary hardship to the owner without any compensating benefit to the community.

PAINTING STANDPIPES.

On pages 313 and 314 will be found the remaining portion of the table referred to by the article on this subject in the November 1st issue. Below are given additional notes concerning cities not given in the table, supplementing those given in last week's issue.

Seattle, Wash.: 3 standpipes, 2 enclosed; painted about every two years, one coat of asphalt; cost about 25 cts. a square yard.

Seneca Falls, N. Y.: Constructed 1896; iron and steel; 30 by 100 feet; no tower or roof; hard surface water, filtered, using alum. Painted in 1901, scraped and wire brushed; 2 coats. Also painted in 1907 and 1911.

Sharpsville, Pa.: Constructed 1900; steel (?); 20 by 40 ft.; no tower or roof; hard water. Not painted since erection.

Tacoma, Wash.: One constructed 1890; iron, 20 by 125 ft., no tower or roof; another in 1909, steel, 40 by 65; a third in 1910, steel, 30 by 70 ft.; all painted with red lead.

Ventnor, N. J.: Constructed about 1907; iron (?), 20 by 100 ft.; no tower or roof; hard ground water. Painted about 1915, material not known; not very satisfactory.

PREVENTION AND CURE OF "RED WATER."*

Effected by Removal of Oxygen from Water—Use for This Purpose of Deactivator and Filter.

By WM. H. WALKER.

People who live in districts supplied with soft water, such, for example, as the New England States and New York City, are familiar with what has been termed the "red water plague." This condition of the water is caused by the presence in it of hydrous red oxide of iron, commonly spoken of as rust. The fact that this oxide of iron is present in the water means that the iron pipes of the hot-water supply system have been correspondingly corroded by the water, and have been pitted or otherwise weakened in proportion to the amount of iron removed. Thus the iron is taken from where it is needed, namely, the walls of the pipes, and placed in an objectionable form where it is not wanted, namely, in the water. Many factors incident to modern city life have united in greatly increasing the daily consumption of hot water, and the loss due to failure of pipe lines through clogging by deposited rust, as well as leaks due to pitting, has now become a most important problem.

A great deal of very valuable research has been devoted to the causes of the corrosion of iron, notably by the Massachusetts Institute of Technology, and the seed sown by the early investigators is now beginning to bear fruit. It was

*Paper before New England Water Works Association.

Summary of Reports on Painting the Interior Surfaces of Standpipes

Place	Date Painted	Prepa-ration	No. of Coats	Kind of Paint	Amount and Cost, Including Applying	Condition of Standpipe
Matawan, N. J.	....	S	..	Dixon's graphite		Painted but once since built
Medford, N. J.	1914	....	..	Dixon's graphite		
Media, Pa.	1909	S W	2	Dixon's graphite	55 gals., $15	
	1916	S W	2	Dixon's graphite	30 gals., $127	
Middleboro, Mass.	1885 to 1911	S	2	Asphalt locally made		Painted every 2 or 3 yrs. Metal well protected. Taken down in 1915
Nantucket, Mass.	....	S W	..	Various asphalt mixtures and hot Alcatraz asphalt§		18 times between 1878 and 1906. Taken down in 1909
Nantucket, Mass.	1908	....	2	Met. P & W. C. graph. elast. No. 1	50 gals	About all gone in 8 yrs.
	1916	....	1	Bit. mixture put on boiling hot over layers of asphalt varnish	14 bbl.	
Narragansett Pier, R. I.	....	L	1	Graphite		
	....	L	1	Asphalt		
	1914	S W	1	Asphalt	$375	
Needham, Mass.				No painted since original construction		
New London, Conn.	1897	....	2	Asphalt	30 gals., $90	
	1903	....	..	Graphite	53 gals., $102	
	1909	W	..	Graphite	10 gals., $13	
	1912	W	..	.....	$99	
New York City	1911	....	3	Red lead		
New York City	1911	S W	1	Red lead		
North Attleboro, Mass.	††	....	2	Det. Gr. No. 501 "Hyd. priming & No. 106" Hyd. priming	30 gals. of each Labor for 2 coats. inside and out, $200	About 1912 sand blasted (cost $1250) after some years' neglect. Badly pitted
Norwood, O.	....	....	..	Never painted.	"Paint not needed"	
Oak Bluffs, Mass.	1890	....	3	Asphalt		
	1894	....	2	Asphalt		Paint mostly gone
	1900	....	2	D. M. C. on one-half Kauri zinc on rest		Paint mostly gone D. M. C. All gone on 5 lowest rings. Zinc on some, gone on others
	1907	....	2	Chrysolite	31 gals.	
	1911	....	2	Creolastic black		
Old Orchard, Me.	1912	S W	..	Graphite		
	1916	S W	2	S & W metallistic	45 gals. $382*	
Onset, Mass.	1894	....	2	Iron metallic paint	10 to 12 gals.	Not durable
	1913	S W	2	Graphite (metallistic)	$200	
Ossining, N. Y.	1907	S W	1	Asphalt	About 20 gals.	Corrosion very slight; deposit from water seems to protect metal
Palatka, Fla.	1881	....	..			
	1896	....	2	P & B No. 2	30 gals.	Inside badly pitted
	1898	....	2	D M C	30 gals.	Badly scaled
	1902	....	2	D M C	33 gals.	Paint entirely gone
	1911	....	2	Creolastic		
Paris, Ky.	1891	....	3	Asphalt		
	1905	....	2	Chrysolite	35 gals.	
Perry, N. Y.	1900	S	2	Graphite	1 bbl.	
	1905	....	2	Graphite		
	1909	....	2	Graphite		
	1912	....	2	Graphite		
Philadelphia, Pa.	1882	....	3	Lead paint		
Philadelphia, Pa.	1900	....	3	Lead paint		
Plainville, Mass.				Not painted from 1909 to 1917		
Portland, Me. (3)				All painted in 1906. Expect to paint in 1917.		
Portland, Ore.	1909	....	2	Ferrubron		
	1914	....	..	.....		Outside only
Portland, Ore.	1900	....	..	Red lead		
	1906	S W	2	Ferrubron		
	1912	....	..	.....		Outside only
Portland, Ore.	1912	....	..	Ferrubron		
Putnam, Conn.	1885	....	3	Asphalt		
	1893	....	1	Asphalt		
	1896	....	1	Asphalt		
	1905	D S	2	Chrysolite	25 gals.	2 bottom sheets and part of third rusty, top sheets in poor shape. Upper 30 feet
Rahway, N. J.	1906	....	2	Dixon's sil. graphite		
	1913	....	1	Red lead		
			1	Dixon's graphite		
Reading, Mass.	1895	W	1	Government waterproof	$376*	
	1897	W	1	Smith's D M C	450*	
	1901	W	1	Smith's D M C	517*	
	1904	W	1	Smith's D M C	616*	
	1909	W	1	Smith's D M C	718*	
	1913	W	2	Bitumastic enamel	1609*	
Rockville, Conn.	1914	W	1	Asphalt	$125*	
Rutland, Mass.	1896	....	..	Red mineral paint		Not painted since
St. Louis, Mo.	....	....	..		Never painted. Abandoned after 30 years. Badly pitted at water line only	
St. Louis, Mo.	....	....	..		Interior not painted; still in service; "corrosion negligible"	
St. Louis, Mo.	1898	....	2	Red lead		
	1915	S W	2	Red lead	400 lb. lead, 15 gal. oil, 5 gal. turpentine	Badly corroded in spots. Generally protected by lime coating
St. Louis, Mo.	1908	....	2	Graphite		
	1915	....	..	Red lead		No paint left; very little corrosion; lime coating
Sewickly, Pa.	1907	L W	1	Carbon coating	25 gals. $60	
	1911		1	Carbon coating	30 gals. $100	
Spencer, Mass.	1899	....	1	.....		
	1904	W	1	Nat. P & V. Co. graph. elast.	$68*	
	1912	W	1	Nat. P & V. Co. graph. elast.	$60	
Spokane, Wash.	1904	W	1	Asphalt		
Summit, N. J.	1914	S W	2	Hot coat similar to Bitumastic		
Summit, N. J.	1894	S W	2	White lead		
	1900		2	Hot asphalt		
	1912	....	2	Dixon's graphite	35 gals.	

SUMMARY OF REPORTS ON PAINTING THE INTERIOR SURFACES OF STANDPIPES—(Continued)

Place	Date Painted	Preparation	No. of Coats	Kind of Paint	Amount and Cost, Including Applying	Condition of Standpipe
Millis, Mass.	1909	S	1	Graphite		
	1912	S	1	Graphite		
Milwaukee Wis.	....	....	..	Interior not painted	Standpipes in excellent	condition
Minneapolis, Minn.	1915	S	1	Red lead		
Minneapolis, Minn.	1916	S	2	Red lead	Not painted since 1893	Paint gone; badly pitted
Montclair, N. J.	1897	S W	..	Asphalt	35 gals., $27	
	1902	S W	..	Harrison's T & C. 106	25 gals., $20	
	1906	S W	..	Dixon's graphite	25 gals.	
Syracuse, N. Y.	1910	....	1	Red lead		Inside badly pitted in 1916
			2	Carbon coating		
Tisbury, Mass.	....	S W	2	White lead	15 to 20 gals., about $50	Every 2 years for 10 years.
Toledo, O.				Probably similar to c. i. pipe coating		Not painted since erection; now out of service
Tuckahoe, N. Y.	1912	S W	2	Red lead		
	1913		2	Red lead		
	1914		2	Red lead		
Vincennes, Ind.	1910	S W	2	Graphite		Much ice in standpipe each winter
Washington, D. C.	1910	S W	1	Chrysolite	12 gals., $65	
	1915		1	Chrysolite	12 gals., $65	
Waterloo, N. Y.	1914	....	1	Dixon's graphite		
West Orange, N. J.	1908	S W	..	Dixon's graphite	25 gals., $32†	
Westport, Conn.	1916	....	..	Hot bituminastic enamuel		
Weymouth, Mass.	1890	S W	2	Government waterproof	$42‡	
	1892	....	1	Government waterproof	$63‡	
	1894	....	2	Government waterproof	$56‡	
	1896	....	2	Government waterproof	$44‡	
	1899	....	2	Government waterproof	$673	
	1904	....	2	Waterproof paint	$569	
	1907	....	2	Waterproof paint	$620	
	1911	....	2	?	$550	
	1915	S W H	2	W. H. & Co. red lead in oil.	40 gals, $643	
Winchester, Mass.	1910	....	2	Elastic graphite	35 gals.	"Lots off ice"
	1916	S W	..		S and W, $25; painting $30	Asphalt failed after 1 year; 2 coats of el graphite lasted 3yrs.; another 2 coats, 6 yrs.
Winchester, Ky.	1891	....	3	Asphaltum		
	1905	....	2	Chrysolite	20 gals.	
Windsor, Conn.	1916	....	1	Det. graph. penstock paint	30 gals.	
			1	D. G. No. 106		
Winthrop, Mass.	1914	....	2	Metropolitan specification	$475	Painting when erected poor job
Wolcott, N. Y.	1913	....	2	Asphalt	$25	

Woonsocket, R. I., No 1 painted 1903, 1905, 1907, 1909 and 1914. No. 2 painted 1903, 1905, 1907, 1909 and 1914, No. 3 painted 1902, 1904, 1906, 1908, 1910 and 1914. In each case scraped and wire brushed, and given two coats of durable metal coating. The amount and costs were as follows: No. 1-24 gals., $139; 24½ gals., $130; 24 gals., about $120; 24 gals., $133; 24 gals., about $146. No. 2-27 gals., $162; 28½ gals., $152; 28 gals., about $146; 28 gals., $155; 28 gals., about $167. No. 3-46 gals., $204; 52 gals., $207; 52 gals., $196; 51½ gals., $242; 51½ gals., $217; 51 gals., about $240.

For footnote see page 298.

for many years thought that rust was formed by the direct union of the oxygen of the air, water and the iron. Now we know that such is not the case. In order to form rust, the iron must actually go into solution in the water; if oxygen is present, it later unites with this dissolved iron, separating as red rust. The formation of rust by the oxygen is thus the result of, not the cause of, the solution of the iron and its resultant corrosion. But careful study showed that the oxygen, which is normally dissolved in all water, plays a more direct and controlling part in this corrosion. Where iron dissolves in water, an equivalent or corresponding amount of hydrogen is set free from the water in the form of gas. This hydrogen covers the surface of the iron and protects it from further attack. But if oxygen be present, it unites with this hydrogen, destroys the protective covering and allows the solution of the iron to proceed. Speaking electro-chemically, the hydrogen polarizes the surface of the iron, and the dissolved oxygen acts as a depolarizer. Where there is a complete absence of oxygen in a system, no appreciable corrosion of the iron will take place.

The action of all the factors causing corrosion is greatly accelerated by rise in temperature. Hence a hot-water supply system in which fresh (that is, water fully charged with atmospheric oxygen), hot water is constantly passing through, is a most vulnerable structure. But since oxygen is consumed in the process of corroding iron and forming rust, it is obvious that if the water be held in contact with an iron surface it will soon lose all its dissolved oxygen and become inactive so far as further corrosion is concerned. Careful experiments have established the fact that the amount of corrosion, other factors being the same, is directly proportional to the free oxygen content of the water.

This removal of dissolved oxygen is now accomplished upon a commercial scale by an apparatus called a "deactivator." The water from the street main first passes through a heater to raise the temperature to about 160° Fahr. and then through a storage tank containing a large number of iron sheets chemically treated so that rapid corrosion of their surface takes place. The oxygen is promptly consumed by corroding these cheap and easily replaceable sheets instead of the expensive and difficultly replaceable tank and piping system. The hot water, now free from oxygen but carrying some of the suspended iron rust, passes through a filter where all floating particles are removed, and clear water delivered. This water is now deactivated and can be sent through the supply system without injury to the pipes or inconvenience to the consumer.

In the plant in Pittsburgh, where this process was first tried on a large scale nearly four years ago, some pipe was placed in the outlet from the deactivator. No corrosion has been found so far and the trouble with the old piping in this building has apparently ceased. The metal used to unite with the oxygen in the water is, of course, of the cheapest form and easily replaced. In one plant installed for experimental purposes in an apartment house in Boston, the sheets were removed after two years of service and showed a loss of 25% in weight due to rusting. But no trouble with the piping had developed during that time and experience indicates that none is to be expected so long as this treatment continues. If this amount of rust had come from the pipes, serious trouble would no doubt have occurred.

A detailed description of this process and the two plants referred to above will be found in a paper on "The Preservation of Hot Water Supply Pipe in Theory and Practice" by Speller and Knowland, Trans. American Society of Heating & Ventilating Engineers, 1918.

The advantages of this system are that the deactivation of the water by removal of free oxygen is automatic and does not change the quality of the water for domestic purposes. No attention is required other than the ordinary removal of the accumulated hydroxide of iron from the filter by reversal of the flow at regular intervals.

NEWS OF THE SOCIETIES

Dec. 10. AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual convention, Louisville, Ky.

Dec. 25. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York City. Secretary, Calvin W. Rice, 29 West 39 st., New York City.

Feb. 9-13, 1920.—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention. Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

May 18-21, 1920—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting Secretary, S. A. Sewall, 29 West 39th st., New York City.

National Electric Light Association.

President R. H. Ballard, of the National Electric Light Association, announces the acceptance by John F. Gilchrist, vice-president of the Commonwealth Edison Company, of Chicago, of the chairmanship of the committee on public information, and also by Frank T. Griffith, president of the Portland (Ore.) Railway, Light & Power Company, of the chairmanship of the committee on water-power development. These important committees will have valuable and instructive reports to submit to the national convention of 1920, which will be held in southern California.

The committee on public information is a new committee in each state or geographical section a local committee which will finance itself and furnish news bulletins to the press through member companies. This will be a very large committee, but as its work will be largely devoted to states and geographical sections, it is unlikely that its entire membership will ever be called to meet so that its proportions will not be objectionable. Mr. Gilchrist was instrumental in starting a movement along these lines in Illinois which proved very successful. It is believed that to extend it to every state in which company members may desire assistance will accelerate its effectiveness. In the committee on water-power development Mr. Griffith will associate with himself prominent executives from all of the Pacific Coast companies and also some of the executives from Eastern companies. The purpose of its organization is to investigate and encourage water-power development, and it is the first general committee of the association to take up this most important feature of the electrical industry. The Department of the Interior and the War Industry Board and other bodies have collected an enormous amount of data in relation to the problems of water-power development. Mr. Griffith's committee will not only collect and codify the information gathered by these bodies, putting it into workable shape for the use of geographical and central bodies, but will pursue when there seems to be necessity a line of original investigation. The necessity for conservation of the natural resources of the nation, the impending shortage of both coal and fuel and the probability of large increases in the demand for electric energy by partial railroad electrification, make the work of this committee of paramount importance and its report will be of the greatest assistance in the large financing which extensive water development will involve.

President Ballard has also received from S. M. Kennedy, general agent of the Southern California Edison Company, Los Angeles, his acceptance of the chairmanship of the committee on service and from Lee H. Newbert, Pacific Gas & Electric Corporation, San Francisco, his acceptance of the chairmanship of the committee on cooperation in the industry.

Mr. Kennedy's committee will work on the conditions of service from this viewpoint: With the regulation of rates and finances by state utility commissions to provide only safe returns on capital invested, and with a courageous attitude of these regulating commissions to see that such return is allowed, electric utility companies are entirely out of politics and can devote their energies to the service of the public without any encumbrance to the highest achievement.

Mr. Newbert's committee will endeavor to formulate and submit to the next convention a plan by which all of the branches of the electrical business may cooperate and to show specifically how this plan can be practically worked out in the geographic sections. Mr. Newbert has been very active in the California electrical cooperative campaign, of which he has for several years been chairman. This movement had its origin in the Pacific Coast Section, has met with remarkable success in the organization of central stations, manufacturers, jobbers and contractor-dealers, and has demonstrated that they can work together for the general good of the industry. Chairman Newbert in appointing the members of his committee will make selections from all branches of the industry.

Western Society of Engineers.

At a meeting held by the Western Society of Engineers in Chicago recently four experts on electric railways presented different phases of the problem.

James R. Bibbins, of the Arnold Co., Chicago, introduced the problem as a whole and gave a historical review. He showed the importance of the electric railway utilities to the communities they serve. Their capitalization of $4,800,000,000 has been subjected to heavy shrinkage. Not only have material costs risen, but wages also, while labor apparently has the whiphand. The public has been educated to the 5-cent fare and demands that consideration be given only to the depreciated value of the properties. Some nine different remedies have been proposed, of which many are quite radical. Mr. Bibbins reviewed the history of a railway system in a large city with 5-cent fare dating to 1860. Fairly stable conditions existed up to 1890 when the line was electrified; the heavy capital costs thereof practically wiped out earnings for nearly 10 years. As they picked up again, optimism was felt and franchise renewals were accepted without proper allowance for depreciation. The 5-cent fare does not now yield sufficient income.

A paper by P. J. Keeley, president of the Kansas City Railways Co., on "Valuation and Accruing Depreciation" was read by secretary Nethercut in Mr. Keeley's absence. At first the problems seemed local and greatly diversified, but more recently they have become national and crystallized into realization that the companies cannot render service on their present incomes. The Federal Electric Railway Commission may produce some valuable findings from its investigation. One feature coming to be recognized is that it is impossible to keep a street railway property in better than 80 to 90 per cent. perfect condition, yet it can give 100 per cent. service. The practice set by the Wisconsin Railroad Commission of fixing rates on the depreciated value of the property is being abandoned by this and other commissions because it is essentially unfair to the investor. Valuation based on reproduction new is now the accepted practice because equitable. Solution lies in acceptance of the cost-of-service principle as basis for rates.

"The Actuarial Problem" was the title of a paper by W. J. Hagenah, consulting engineer, Chicago, read by Mr. Jirgal in the author's absence. Depreciation funds are seldom set aside specifically as such. The practice of accountants is usually to draw on the general surplus or reserve for renewals instead of on special depreciation funds. Each generation should bear its share of development expense and depreciation. Patrons must provide sufficient income to meet costs and investors must make proper allowance for current and accrued depreciation in order to permit continuous service and keep the property intact. Depreciation must be provided for in advance and the income must be sufficient to permit this. There is an undoubted tendency toward using the reproduction cost new as basis for rate making.

George Weston, consulting engineer, Philadelphia, presented a paper on "Electric Railway Policy." One of the most important problems is to secure harmony between labor and capital, then to promote economy and give the best possible service. Public authorities must be fair; in the past they have taken the "pound-of-flesh" attitude too often and denied a fair deal to the companies. Labor must be as-

signed a participating partnership in the business and compelled to assume its obligations. Assuring it full opportunity to have redress for wrongs, it must be deprived of the right to strike. Mr. Weston referred to the success of the Philadelphia Rapid Transit co-operative plan, which has been developed during 9 years. A feature of it is to promote thrift and stimulate service. Most companies cannot resort to such slow development of co-operative service in the present emergency and must have more revenue.

National Free Zone Association.

The National Free Zone Association is maturing its plans for an active campaign to secure general permissive legislation at the hands of Congress, authorizing the inauguration of "free zones" in the ports of the United States.

J. S. Dunnigan, of San Francisco, has been made secretary of the association. He is to be established permanently at Washington until Congress takes favorable action.

The aim of the National Free Zone Association is not to bring about the establishment of a free zone in any particular port, but rather to secure the enactment of a bill which will establish the principle of free zones in the United States, placing in the hands of the Secretary of Commerce, or other designated appointees, the matter of determining the location of such zones.

Plans are being matured for a public hearing before the joint committees of Congress which have the bills in question under consideration, and government officials and departments are coming out in favor of the project.

Membership in the association is increasing, several organizations having placed themselves in Class I in the membership, thereby giving the fullest possible support to the work.

The president of the association, Arthur McGurk, of New Orleans, will spend much time in Washington. Mr. McGurk and Mr. Dunnigan will be guided in their activities by the executive committee and board of directors, who have power to act between meetings of the association.

Mr. Dunnigan has temporary quarters at 1925 F street, Washington.

Pan Pacific Engineering Congress.

A Pan Pacific Engineering Congress, to which engineers from all countries touching the Pacific, including India, are welcome, will be held in Weltevreden, near Batavia, Java, May 8 to 15, 1920, under the patronage of the Governor General of Netherlands India and the auspices of the East Indian branch of the Royal Dutch Institute of Engineers. The fee is $6.25, which includes the printed proceedings of the meeting. English and Dutch will be the official languages.

A total of 469 subscriptions have already been received from many countries, including Japan and Australia, together with 170 papers on engineering problems in Asiatic countries. These papers will be discussed in six groups: Rail and steamer traffic; irrigation, water supply, and sanitary service; roads, bridges, buildings, and city planning; industry and the production of energy; mining industry and geology; and miscellaneous. The discussion will include statistics of various classes, terminal, coaling and port facilities, free ports, irrigation, water supply, the removal of sewage and refuse; the construction of roads, bridges, and buildings of all kinds, with special reference to the construction of cheap dwelling houses for the natives; earthquake and fireproof materials; the financing of public service corporation, taxes, and public loans; the utilization of steam, electric, and water power.

Excursions to the most interesting parts of the islands will be arranged at the close of the congress. Applications for participation in the congress should be sent to the secretary of the Congress (address Molenvliet East 3, Weltevreden, Java), who will arrange for hotel accommodations and trips. Full information regarding trips will be furnished by the Tourist Bureau Ryswyk 17, Weltevreden, Java. The Far Eastern Division of the Bureau of Foreign and Domestic Commerce, Washington, has on file descriptive pamphlets giving considerable information in regard to the congress, including the names of the authors of some of the more important papers.

The congress offers to machinery and metal salesmen a good opportunity to make useful acquaintances and to exhibit samples, as $8,000,000 worth of machinery is bought annually by the Netherlands Indies. Americans must be represented by a Java firm in order to exhibit. A list of the machinery houses in Java will be available in the Far Eastern Division for those who are interested. B. J. Krol, 39 Oosteinde, Bandoeng, Java, is the secretary of the Netherlands Indies Industries Fair and further information can be obtained from him.

PERSONALS

Smith, Cedric B., has been appointed editor of "The Monad," official publication of the American Association of Engineers. Mr. Smith is a graduate in both arts and civil engineering from the University of Minnesota. His engineering experience has been somewhat extensive in the railroad field. During the war Mr. Smith was an officer in the Coast Artillery Corps, and served in France with the 74th Artillery. Since 1915 he has made his home in Pittsburgh.

Watson, M. W., who has served as acting state highway engineer since July 15, 1918, in the absence of W. S. Gearhart in army service, has been appointed state highway engineer by the Kansas Highway Commission. A large amount of road construction is in progress and more is planned, which will be directly under the supervision of Mr. Watson. Before entering the service of the state, Mr. Watson practiced engineering in connection with coal mining, railroad work and municipal work in southeastern Ohio. He also served in the civilian branch of the United States Army in connection with the improvement of the Ohio River. For five years previous to entering the service of the Kansas Highway Commission as road engineer, in 1917, he served with the Illinois State Highway Department. He is a graduate in civil engineering from the Ohio State University.

Vollmer, H. G., has resigned his position as city engineer of Burlington, Ia., and he will be succeeded by his brother, Henry Vollmer, who recently returned from service abroad.

Cowen, Clinton, for the past four and a half years state highway commissioner of Ohio, has resigned and has accepted a position as consulting engineer for the National Sand and Gravel Association. He will assume his new duties Jan. 1. A. R. Taylor, former county surveyor of Hancock County, has been appointed to fill the vacancy caused by Mr. Cowen's resignation.

Schott, A. M., has been appointed city engineer of Sioux City, Iowa, to succeed T. H. Johnson, who resigned recently to enter private practice.

Tolman, Mayo, former director and chief engineer of the West Virginia State Department of Health, has resigned.

Tisdale, Ellis S., has been appointed director and Andrew N. Wardle chief engineer, respectively, of the West Virginia State Department of Health, both of which positions were filled by Mr. Tolman. Both Mr. Tisdale and Mr. Wardle have served three years as assistant engineers in the State Department of Health.

Webster, D. W., for several years highway engineer of Lyon county, Minnesota, has resigned to accept a position with the state as division engineer of the northwest section. Arthur Bladholm succeeds him.

Gray, Cresleigh, has been appointed engineer in charge of the recently organized bureau of contracts, one of the five subdivisions of the division of construction, Indiana State Highway Commission. Mr. Gray is a graduate of Rose Polytechnic Institute and has been connected with the State Highway Commission since its organization several months ago. Karl Eisenhardt has been appointed assistant engineer of the Bureau of Contracts.

Van Arnsdoll, C. C., and Fred Oehler, of Clarkston, Wash., and E. M. Booth, of Lewiston, Idaho, have formed an engineering partnership to specialize in highway construction work. Mr. Booth was formerly state highway engineer of Idaho.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STREETS AND ROADS.

Ark., Little Rock. 11 am, Dec. 20.
110.33 mi. roads in Desha co. of gravel on 5-in. sand base, or concr., or asphaltic macadam (penetration method), or warrenite, or asphaltic concr. on concr. base, as follows: sect. no. 1, 21.63 mi., involving 96 acres clearing and grubbing, 2,560 rods fence omving, 181,425 cu. yd. embankment, 2,198 lin. ft. 18 to 36-in. pipe, 728 cu. yd. concr. in pipe headwalls, culverts, and bridge abutments, beam and truss bridges, and 177,625 sq. yd. pavement, etc. Section no. 2, 40.36 mi., involving 207 acres clearing and grubbing, 1,668 fence moving, 373,425 cu. yd. embankment, 3,502 lin. ft. 18 to 36-in. pipe, 2,511 cu. yd. concr. in pipe headwalls, culverts and bridge abutments, 34,380 lbs. reinforcing metal, beam and truss bridges and trest less, and 331,442 sq. yd. pavement. Section no. 3, 16.86 mi., involving 82 acres clearing and grubbing, 970 rods fence moving, 124,815 cu. yd. embankment, 1,502 lin. ft. 18 to 36-in. pipe, 1,252 cu. yd. concr. in pipe headwalls, culverts and bridge abutments, 17,450 lbs. reinforcing metal, bridges, and 138,551 sq. yd. pavement. Section no. 4, 17.03 mi., involving 15 acres clearing and grubbing, 5,015 rods fence moving, 146,696 cu. yd. embankment, 1,310 lin. ft. 18 to 30-in. pipe, 837 cu. yd. concr. in pipe head walls, culverts and bridge abutments, 11,360 lbs. reinforcing metal truss bridges, and 139,910 sq. yd. pavement. Section no. 5, 9.26 mi., involving 30 acres clearing and grubbing, 10 rods fence moving, 66,600 cu. yd. embankment, 954 lin. ft. 24-in. pipe, 440 cu. yd. concr. in pipe headwalls, culverts and bridge abutments, 5,880 lbs. reinforcing metal, bridges, trestles, and 76,060 sq. yd. pavement. Section no. 6, 5.19 mi., involving 4 acres clearing and grubbing, 1,700 rods fence moving, 38,190 cu. yd. embankment, 314 lin. ft. 24-in. pipe, 135 cu. yd. concr. in pipe headwalls, culverts and bridge abutments, 6,050 lb. reinforcing metal, 383,868 sq. yd. pavement.—Canter & Knoch, engrs., A. O. U. W. Bldg.

Ark., Osceola. 2 pm, Dec. 16.
Improving road in Mississippi co., involving 30 acres clearing and grubbing; 15 acres grubbing; 9,270 rods fence-moving; 460,000 cu. yd. earth excav.; 2,000 lin. ft. 12-in., 300 lin. ft. 18-in. and 200 lin. ft. 24-in. vitr. clay pipe; 18 catch basins with castings; 5,963 cu. yd. concr. for bridges, culverts, abutments and retaining walls; 25,340 lin. ft. cement concr. curb and gutter; 532,550 sq. yd. cement concr. paving, 20 ft. wide, 8 in. thick; 17,590 sq. qd. 30 ft. wide and 7⅝ in. thick, reinforced; 27,250 sq. yd. 40 ft. wide 7⅝ in. thick, rein.; 7,550 sq. qd. 50 ft. wide, 7⅝ in. thick, rein.; 360,000 lin. ft. round bars for reinforcing paving; 16,426 cu. yd. rock or gravel subbase, etc.—R. C. Rose, secy., Rd. Impvt. Dist. no. 1.

Cal., Riverside. Dec. 17
Grading and surfacing with gravel various rd. dists.—A. C. Fulmot, Co. Engr.

Ga. Sylvester 11 am. Dec. 19.
3.95 mi. fed. aid proj. no. 210 in Worth co., involving 37,333 sq. yd. asphaltic concr., Kentucky rock asphalt, on penetration macadam pavement, 16,494.3 cu. yd. borrow excav. and 9,340.6 cu. yd. common excav.; concr. arch culverts and box culverts, concr. slab and T-beam bridges—O. H. Lang, proj. engr., Moultrie.

Fla., Jacksonville. Dec. 28.
Paving alleys in 2 wards—City comm.

Ill., Chicago. 11 am. Dec. 18.
Following public impvts.; Grading and paving with 7-in. portland cement concr., surface coated with asphalt or coal tar and dressed with ¼-in. torpedo sand, roadways of alleys; concr. curb, grading and paving with vitr. brick on 1-in. portland cement mortor and 6-in. portland cement concr., etc., roadway of alleys; tile pipe sewer with new brick manholes and catch basins, grading and paving in various alleys; adjoining sewer manholes and catch basins, constructing and connecting catch basin inlets, new brick catch basins, gravel concr. combined curb and gutter on cinders, gravel or sand, grading and paving with asphalt on 6-in. portland cement concr. on city street; sewerage work, concr. curb on cinders or sand, filling and paving with 8-in. blast furnace slag or 8-in. limestone bonded with asphaltic cement on city street; sewerage work, granite concr. combined curb and gutter on cinders, gravel or sand, grading, filling and paving with standard asphalt wearing surface and binder course on 6-in. portland cement concr. on roadways of system of streets—M. J. Faherty, pres., bd. local impvts.

Ind., Albion. 2 pm, Jan. 6.
Road in Washington twp., Noble co.—H. C. Erwin, co. aud.

Ind., Anderson. 10 am, Dec. 22.
14,960 ft. concr. road in Monroe twp., Madison co.—T. Flahavin, co. aud.

Ind. Anderson. 10 am. Dec. 29.
2,483 ft. concr. rd. in Anderson twp.; 6,272 ft. concr. rd. in Pinecreek and Duckcreek twps., and 15,800 ft. concr. rd. in Anderson twp., Madison co.—E. T. Flahavin, co. aud.

Ind., Columbus. 10 am. Dec. 31.
13,930 ft. crushed stone rd. in Hancock twp., Bartholomew co.—R. Henderson, co. aud.

Ind., Columbus. 10 am, Dec. 31.
13,930 ft. crushed stone rd. in Hancock twp., Bartholomew co.—R. Henderson, co. aud.

Ind., Columbia City. 1 pm, Dec. 27.
32,032 ft. gravel rd. in Smith twp., Whitley co.—W. K. Burwell, co. aud.

Ind., Corydon. 2 pm. Jan. 6.
Stone or gravel rd. on line between Posey and Taylor twps.; 15,520 ft. stone rd. in Franklin twp.; rd. in Jackson twp.—S. C. Mauck, co. aud., Harrison co.

Ind., Fowler 1 p.m., Jan. 20.
15,830 ft. gravel road in Center Twp., Benton Co.—W. Mankey, Co. Aud.

Ind., Fowler. 1 pm, Jan. 5.
15,830 ft. gravel rd. in Gilboa twp., Benton co.—W. Mankey, co. aud.

Ind., Greenfield 10 a.m., Dec. 26
Following roads in Hancock County: 2¼ mi. gravel in Buck Creek Twp.; 1¾ mi. macadam in Buck Creek Twp.; 1 mi. gravel in Vernon Twp.; concrete road in Brown Twp.; concrete road in Jackson Twp.; 2¾ mi. gravel road in Sugar Creek Twp.—C. Boone, Co. Engr., courthouse.

Ind., Greenfield. 10 am, Dec. 26.
12,073 ft. gravel rd. in Buck Creek twp.; 7,000 ft. crushed stone rd. in Buck Creek twp.; 14,940 ft. gravel rd. in Sugar Creek twp.; 1,100 ft. concr rd. in Brown twp.; 1,820 ft. concr. rd. in Jackson twp., and 5,352 ft. gravel rd. in Vernon twp.—H. J. Rhue, co. aud., Hancock co.

Ind., Hartford City. Jan. 5.
Crushed stone rd. in Jackson twp., Blackford co.—W. C. Hughes, co. aud.

Ind., New Albany 10 a.m., Jan. 10.
30,180 ft. gravel road in Floyd Co.—J. D. Mitchell, Co. Aud.

Ind., Plymouth. 1.30 pm, Jan. 6.
Gravel rd. in Tippecanoe twp.; 3 gravel rds. in Bourbon twp.; gravel rd. in Center twp., and gravel rd. in Polk and West twps., Marshall co.—O. H. Weber, co. aud.

Ind., Rensselaer. 2 pm, Jan. 5.
Stone rd. in Walker twp., Jasper co.—J. P. Hammond, co. aud.

Ind., Vincennes. 2 pm, Jan. 6.
Gravel rd. in Harrison twp., Knox co.—J. S. Nicholson, co. aud.

Ind., Williamsport. 9 am, Jan. 5.
4,065 ft. gravel rd. in Steuben twp., Warren co.—W. H. Stephens, co aud.

Kan., Lindsborg. 2 pm, Dec. 16.
25,000 sq. yr. vertical fibre brick paving, 2,160 lin. ft. combination curb and gutter—H. A. Rowland, engr, McPherson.

Ky., Frankfort 2 p.m., Dec. 19.
Improving 7.152 mi. road in Mercer Co., involving 777 cu. yd. earth excavation; 61,370 sq. yd. scarifying; 68,326 lin. ft. grader work (one side); 22,400 gal. bituminous material; 839 tons stone chips or pea gravel; 638 lin. ft. 18-in. and 174 ft. 24-in. C. M. pipe, 735 cu. yd. concrete; 24,763 lbs. reinforcing steel; 17,162 tons crushed stone, etc.—J. S. Boggs, Com. Pub. Rds., Old Capitol Bldg.

La., Eunice. 7 pm, Dec. 23.
Street impvts. with necessary drainage—J. B. McCrary Co., engrs., Atlanta.

Mich., Adrain. 1 pm, Dec. 13.
7,775 mi. 16-ft. waterbound macadam; also 1 mi. 12-ft. waterbound macadam, or macadam bottom, gravel top in Blissfield twp., Lenawee co.—Co. rd. comrs.

Mich., Lansing 1.30 p.m., Dec. 30.
Placing 3.068 mi. 9-ft. class B gravel surface in Sanilac co.—F. F. Rogers, state hwy. comr.

Mich., Lansing. 1.30 pm, Dec. 18.
Improving 8.498 mi. road in Lima and Scio twps., Washtenaw co., consisting of shaping rd. and drainage structures—F. F. Rogers, state hwy. comr.

Minn., Gaylord. 1 pm, Dec. 23.
1 mi. fed. aid proj. no. 116, involving 68,000 cu. yd. excav., 2,000 cu. yd. riprap, loading and hauling 1,755 cu. yd. gravel surfacing material, furnishing and installing 105 ft. 30-in. and 25 ft. 15-in. portable culvert pipe—F. Hoppenstedt, co., aud.

Minn., Henderson. Dec. 23
Gravel surfacing 1 mi. fed. aid proj. No. 116, 24 ft. wide, involving 68,000 cu. yd. excav.., 2,000 cu. yd. riprap, 1,755 cu. yd. leading and hauling, etc.—S. F. Mullen, Engr., Gaylord.

Miss., Natchez. Dec. 16.
3.6 mi. rd. between Natchez and Fayette in Adams co., involving 4.3 acres clearing and grubbing; 30,000 cu. yd. excav.; 5,700 cu. yd. gravel, etc.—X. A. Kramer, state hwy. engr., Jackson.

N. J., Elizabeth. 3 pm, Dec. 16.
Widening and altering 800 ft. street in Summit; new bituminous concr. roadway, 2,500 ft. long in Linden twp.—J. L. Bauer, co. engr., 120 Broad st.

N. Y., Buffalo. 11 am, Dec. 22.
Repaving several streets and paving market grounds—A. W. Kreinheder, comr. pub. wks.

N. Y., New York 2p.m., Dec. 15.
Repaving with wood block on concrete foundation, with granite block on earth foundation, granite block on concrete foundation, sheet asphalt on concrete foundation, sheet asphalt on granite block foundation in various streets, involving 1,500 cu. yd. concrete in railroad area 4,300 sq. yd. wood block; 6,800 sq. yd. relaying old granite block pavement in railroad area, etc. Also repaving with sheet asphalt on concrete foundation roadway in and between tracks of Lexington Ave., involving 2,200 cu.

BIDS ASKED FOR

yd. concrete in railroad area; 12.050 sq. yd. sheet asphalt in railroad area; relaying 650 cu. yd. old granite block pavement; 500 cu. yd. concrete, etc.—M. F. Loughman, Pres., Boro. of Manhattan.

N. Y., New York. **11 am, Dec. 17.**
Furnishing 10,000 gal. tar-rd. binder—E. Riegelmann, pres., boro of Brooklyn.

N. C., Greenville. **noon, Dec. 19.**
13.94 mi. hwys. in Pitt co., involving 19,161 cu. yd. earth excav.; 24,172 cu. yd. borrow; 130,897 sq. yd. monolithic brick, or concr. base, or 1-course cement concr. pavement, or 122,717 sq. yd. bituminous pavement on concr. base; 708 lin. ft. 24 to 36-in. rein. oncro. pipe; 2 acres clearing and grubbing; 8,589 cu. yd. side drain ditches; and one 16-ft. span rein. concr. bridge—J. B. Harding, co. hwy. engr.

N. C., Raleigh. **noon, Dec. 22.**
1.645 mi. state hwy. in Cleveland co., involving 1,630 cu. yd. earth excav.; 17,374 sq. yd. combination concr. base and header curb; 16,409 sq. yd. warrenite or willite or sheet asphalt or topeka pavement—W. S. Fallis, state hwy. engr.

N. C., Raleigh. **noon, Dec. 23.**
1.352 mi. state hwy. in Cabarrus co., involving 14,260 sq. yd. combination base and header course; .8 acres clearing and grubbing, 2,100 cu. yd. earth excav., etc.—W. S. Fallis, state hwy. engr.

N. C., Raleigh **noon, Jan. 3.**
8 mi. state highway in Alamance Co., involving 1,700 cu. yd. common or earth excavation; 30 lin. ft. 18-in. double strength vitrified culvert; 72,343 sq. yd. 2-in. Topeka surfacing with 77,166 sq. yd. 5-in. base and curb combined, or 77,166 sq. yd. standard 7-in. concrete road, etc.—W .S. Fallis, State Hwy. Engr.

N. C., Raleigh. **noon, Dec. 29.**
5.87 mi. state hwy. in Forsyth co., involving 8.74 acres clearing and grubbing; 41,842.4 cu. yd. earth excav.; 14,426.2 cu. yd. top soil or gravel surfacing; 358 lin. ft. 15-in., 256 ft. 18-in. and 292 ft. 24-in. terra cotta pipe in place; concr. in culvert, arch bridges and head walls; 20,375 lbs. reinforcing steel, etc.—W. S. Fallis, state hwy. engr.

O., Cleveland. **Dec. 19.**
Road in Cuyahoga co., involving 24,000 cu. yd. grading—W. A. Stinchcomb, co. engr.

O., Euclid. Dec. 22.
Sidewalks and 6-in. water main in vil. street—F. A. Pease, engr., Marshall bldg., Cleveland.

O., Youngstown. **noon, Dec. 17.**
Paving various city streets—Dir. pub. serv.

Ont., Finch **7 p.m., Jan. 19.**
Roads in Stormont, Dundas and Glengarry County, aggregating 40.50 mi.—J. G. Cameron, Co. Rd. Supt.

Pa., East Brady. **8 pm, Dec. 15.**
Grading, curbing and paving various streets, involving 3,500 cu. yd. grading; 5,600 lin. ft. curbing; 380 ft. backing curb; 8,060 sq. yd. paving; 390 lin. ft. 12-in., 270 lin. ft. 15-in. and 620 lin. ft. 18-in. pipe sewer, 9 special catch basins and 4 standard catch basins—Douglass & McKnight, boro engrs., 707 Columbia Bank bldg.

S. C., Columbia. **Dec. 11**
Improving 4½ mi. rd. in Florence Co.—State Hwy. Dept.

S. C., Columbia. **Dec. 18.**
Top soil rd. between Union and Newberry co. line, 17 mi.—State hwy. comn.

S. Dak., Rapid City. **2 pm, Dec. 22.**
Paving 54,000 sq. yd.—T. H. Johnson, consltg. engr, Sioux Falls, Ia.

Tex., Cameron **11 a.m., Dec. 11.**
9.06 mi. state highway, federal aid project No. 103, involving 7 acres grubbing, 18,322 cu. yd. excavation; 22,290 cu. yd. borrow; 16,257 cu. yd. surfacing hauled first quarter, 60,509 cu. yd. hauled additional quarters; 448.8 cu. yd. Class A, 169.4 Class B and 78.9 cu. yd. Class C concrete; and 40,542 lbs. steel; alternate bids on Class A concrete and sedgment bulkheads.—A. F. Mitchell, Co. Engr.

Tex., Wharton. **10 am, Dec. 22.**
State rd. and bridge constr. in Wharton co., involving 4.71 mi. grading; 8,550 cu. yd. excav.; 10,319 cu. yd. borrow; 15,000 cu. yd. gravel; 60,000 sq. yd. bituminous surface; 1,700 cu. yd. outfall ditches, etc., on 6.4 mi. rd.—B. D. King, co. engr.

Tex., Wharton. **10 a. m., Dec. 22**
Hwy. impvt. in Wharton co., 5.9 mi. fed. aid proj. No. 15, involving 4.39 mi. grading; 12,000 cu. yd. excav.; 1,000 cu. yd. borrow; 15,400 cu. yd. gravel 61,000 sq. yd. bituminous surface, 11,000 cu. yd. outfall ditches, etc.—B. D. King, Co. Engr.

Tex., Ft. Worth. **Jan. 1.**
Grading and concr. surfacing 5.8 mi. 18-ft. hwy., rebuilding 10 mi. 18-ft. road and 6.2 mi. 18-ft. road in Tarrant co.—R. V. Glenn, engr.

Utah, Salt Lake City. **10 am, Dec. 16.**
Grading and constructing concr. walks; also establishing, opening and extending streets—W. A. Leatham, city recorder.

Va., Richmond. **noon, Dec. 15.**
Following sections state rd.: 1.67 mi. water bound macadam rd. in Botetourt co.; 7.3 mi. water bound macadam rd. in Albemarle co.; 5.3 mi. water bound macadam in Lee co.; 2.1 mi. water bound macadam in Rockbridge co.; 7.3 mi. water bound macadam in Dickenson co.; alternate bids on bituminous penetration macadam—G. P. Coleman, state hwy. comr.

Wash., Fort Worden. 11 am, Dec. 22.
Gravel road and cement sidewalk at Fort Casey, including removing present trestle across Lake Crockett, filling roadway embankment of 8,000 yd., 1,698 ft. 5-ft. cement sidewalk, 1,437 ft. 4-ft. wooden sidewalk, gutter, handrail, necessary culverts, drains, catchbasins, etc.—Constructing Quartermaster, Fort Worden.

W. Va., Wayne. **Dec. 15**
Grading and draining 8 mi. rd. in Wayne Co., involving 83,000 cu. yd. excav. —Co. Comrs.

SEWERAGE.

Ind., Indianapolis. **10 am, Dec. 15.**
Sewer in 2 streets and 240 ft. drain—Bd. pub. wks.

Mass., Boston. **noon, Dec. 12.**
Sewerage works in street in Dorchester—T. F. Sullivan, comr. pub. wks., 508 city hall annex.

Mich., Muskegon. **8 pm, Dec. 15.**
Sewer, involving 200 lin. ft. 48-in. cast iron pipe; 2,160 ft. 48-in., 465 ft. 36-in., segment blk. or rein. concr. sewer pipe, including back fill; 165 ft. 24-in. tile; taking up and relaying 455 ft. 24-in. tile; 185 ft. 18-in. and 300 ft. 12-in. tile; 10 manholes; furnishing and driving 100 piles in Muskegon lake; 980 ft. 48-in. steel pipe with flanged ends, including gaskets; one concr. manhole, etc.; 650 yd. vitr. brick pavement on 8-in. concr. foundation, and 2,000 yd. asphaltic concr. 2½-in. thick on 8-in. concr. foundation—B. H. Tellman, city recorder.

Ill., Chicago. **11 am, Dec. 18.**
See "Streets and Roards."

Minn., Duluth. **11 am, Dec. 11.**
Sanitary sewer in city street—J. A. Farrell, comr. pub. wks.

Minn., St. Paul. **10.30 am, Dec. 15.**
Sewers in several streets—H. W. Austin, city purch. agt.

N. Y., New York **11 am, Dec. 17.**
Sewers in various streets—E. Riegelmann, pres., boro of Brooklyn.

O., Cheviot. **noon, Dec. 27**
Sewering 2 street.—J. Schmitt, Vil. Clk.

O., Cleveland. **Dec. 19.**
Building 8x50-ft. grit chambers, flow channels, pump wells and bridges, to cover same, installing pipe and pumping equipment at easterly sewage works—G. Gasgoigne, 618 City Hall, engr.

O., Euclid. Dec. 22.
Storm sewer in vil. st., 6-in. water mains and sidewalks in 2 streets—F. A. Pease, engr., Marshall bldg., Cleveland.

Okla., Okmulgee. **Dec. 15**
Building sewers, involving 7,500 ft. 8-inch tile blk.—T. P. Paxton, Engr.

Vt. Burlington. **noon, Dec. 22.**
Tile underdrain in city street—T. W. Dix, engr.

WATER SUPPLY.

N. J., Elizabeth. **2.30 pm, Dec. 16.**
Furnishing pipes, fittings, valves, sleeves, tools, etc., to power house at Bonne Burns Institution, Scotch Plains—Oakley & Son, architects, 1259 Clinton Place, Elizabeth.

N. Y., Buffalo **11 a.m., Dec. 16.**
Furnishing mechanical equipment as follows: One engine and dynamo, 1 fan engine, 1 vacuum pump, 1 boiler-feed pump and receiving tank, 1 house-pump, 2 house tanks, tempering coils and housing, etc.—J. F. Malone, comr. parks and pub. bldgs.

O., Canton **Dec. 17**
15,000,000-gal. equalizing basin.—R. W. Pratt, Hippodrome Bldg., Cleveland.

O., Cleveland. **noon, Dec. 19.**
One first high service steam turbine reduction gear driven centrifugal pump for div. of water—Comr. water, 305 city hall.

O., Cleveland. **Dec. 19**
Furnishing one 20,000,000 gal. high ser. steam turbine reduction gear driven centrifugal pump.—R. Hoffman, City Engr.

O., Silver Lake **Dec. 20.**
Water works pumping station consisting of 2 concrete and brick pump houses, furnishing and installing 2 deep well pumping units with pressure tank, cast iron piping valves, etc.—C. A. Courtney, Leader News Bldg., Cleveland, Engr.

Ore., Heppner. **8 pm, Jan. 7.**
Improving water works system, involving gravity supply line and accessories, except pipe and specials; furnishing machine banded wood pipe and special cast iron fittings and valves; furnishing and lay concr. pipe in trench on supply line—Burns & McDonnell, engrs., 402 Interstate bldg., Kansas City, Mo.

Ore., Richland **3 p.m., Dec. 9.**
Water works system.—F. Clarke, Recorder.

Wash., Yakima. **Dec. 12**
12,300 ft. 48-in. pipe, 2,450 ft. 26-in. pipe, either wood stave or rein. concr.—L. M. Holt, supervising engr., Yakima Indian Reservation.

LIGHTING AND POWER.

Can., Winnipeg. **3 pm, Dec. 15.**
Supply hydraulic and valves for water system—C. J. Brown, city clk.

D. C., Washington. **10.30 am, Dec. 26.**
Furnishing electrical equipment and supplies—A. L. Flint, Gen. Purch. Officer, Panama Canal.

Ga., Unadilla. Dec. 31.
Extending water works system and installing electric lighting system—Mayor.

Ill., [illegible]ville. Jan. 1.
Filtration plant—E. M. Henderson, engr.

Mich., Sault Ste. Marie. Dec. 22.
Furnishing 4 electric pumps for pumping station—A. J. Eaton, city clk.

Minn., St. Paul. **10.30 am, Dec. 15.**
Furnishing one 54-in. by 16-ft. return tubular steel boiler on skids at pumping station—H. W. Austin, city purch. agt.

N. Y., New York. **10.30 am, Dec. 15.**
Furnishing boiler and condenser tubes to dept. plant and structures—Bd. purch., municipal bldg.

O., Columbus. **noon, Dec. 15.**
Lighting street, including standards, conduits, cables, etc.—G. A. Borden, dir. pub. serv.

O., Columbus. **noon, Dec. 15.**
Improving street by lighting, including standards, conduits, cable, etc.—G. A. Borden, dir. pub. serv.

Wash., Seattle. 10 am, Dec. 19.
Furnishing four 5667 kv-a oil insulated, water-cooled transformers with accessories and oil; also two 66,000 volt, non-automatic, electrically operated, oil circuit breakers, complete—C. B. Bagley, secy., bd. pub. wks.

FIRE EQUIPMENT.

Tex., Houston. **noon, Dec. 17.**
Furnishing one combination motor-driven chemical and hose car, capacity 1,500 ft. 3-in. hose; and 2 motor combination pumping engines with service carriage, pumping capacity 750 gal. per minute— Fire comr.

BRIDGES.

Alta., Banff **noon, Jan. 7.**
Bridge over Bow river.—Dept. Pub. Works, Ottawa.

Ind., Columbus. **10 am, Dec. 31.**
Bridge in Clifty twp., Bartholomew co. —R. Henderson, co. aud.

OFFICIAL ADVERTISING

Information Wanted

The city of Greenville, Mississippi, wants information from dealers in street sprinklers and flushers, both motor-driven and horse-drawn, with the purpose in view of buying in the near future.

Address all information as to machines, prices, etc., to GUY DREW, City Clerk.

TREASURY DEPARTMENT, Supervising Architect's Office, Washington, D. C., December 4, 1919.—Sealed proposals will be opened in this office at 3:00 P. M., January 5, 1920, for a toilet room in the United States Marine Hospital at Cleveland, O., in accordance with specification and drawing, copies of which may be had at this office or at the office of the Custodian, Cleveland, O., in the discretion of the Supervising Architect. JAS. A. WETMORE, Acting Supervising Architect.

Ill., Findlay. **Dec. 10**
Bridge between Sullivan twp., Moultrie Co. and Okaw and Windsor Twps., Shelby Co., two 120-foot spans on center line, 18-ft. roadway, 32-ft. abutments, 34-ft. pier, involving 843 cu. yd. concr. and 46,140 lb. rein. steel.—T. C. Fleming, Supt. Hwys., Sullivan, Moultrie Co.

Minn., Owatonna. 7 pm, Jan. 6.
Steel and concr. bridge over Straight river, 124 ft. long, 34 ft. wide, with two 8-ft. walks, lamp-posts—J. H. A. Bratz, 506 Chamber of Commerce bldg., St. Paul.

Minn., Walker. **10 am, Dec. 18.**
State bridges in Cass co.—State hwy. dept., Guardian Life bldg., St. Paul.

N. C., Beaufort. Jan. 5.
2,130-ft. bridge over North river, 850-ft. bridge over Smyrna creek and 12-ft. bridge over Howland creek—L. Hooper, engr.

N. C., Raleigh. **Noon, Dec. 15**
2 Culverts and 2 bridges in Granville Co., involving 52,959 cu. yd. concr., 35,478 lb. rein. steel, etc.—W. S. Falls, State Hwy. Engr.

O., Cleveland. **Dec. 13**
Floor on bridge over Cuyahoga river, involving 1,705 sq. yd. creosoted wood blk. and 2,800 ft. creosoted wood plank.—W. A. Stinecomb, Co. Engr.

O., Columbus **Dec. 22.**
Culverts and approaches at Harrisburg and London road.—R. W. Smith, Clk., Bd. Comrs.

O., Columbus. **noon, Dec. 22.**
Culvert and approaches in Pleasant twp. Franklin co. Bd. comrs.

O., Harrisburg. **Dec. 22.**
Culvert and approaches in Franklin co.—C. Lattimer, engr., courthouse.

Ore., Portland. 10 am, Dec. 20.
Two double leaf trunnion bascule bridges with approaches, etc. on Columbia river hwy. across Young's bay, in Clatsop co.—H. Nunn, state hwy. engr., Salem.

Pa., Sharon **Dec. 15.**
Substructure and superstructure of bridges in Mercer County.—M. Simons, Clk., Co. Comrs.

Wash., Wenatchee **2 p.m., Dec. 22.**
Concrete bridge over Wenatchee river near Cashemer in Chelan Co., consisting of 5 concrete arches with concrete retaining walls, 500 ft. long, involving 1,820 cu. yd. concrete, 2,000 cu. yd. earth fill, and 80,600 lb. steel reinforcement.—Co. Engr.

Wis., Madison. **10.30 am, Dec. 27.**
Plate girder bridge, 1,428 ft. long, 15 through plate girder spans of 79 ft. length, double leaf bascule and 2 plate girder approach spans of 97 ft. carrying bascules, concr. piers and abutments, involving 500 tons structural steel, 55 tons rein. steel, 2,400 cu. yd. class A concr., 265 sq. yd. paving, 470 lin. ft. gas pipe for hand railing, 500 cu. yd. riprap, etc.—Sherzer Rolling Lift Bridge Co., Chicago, Ill.

Cuba, Santo Domingo. Jan. 15.
Rein. concr. bridge and approaches over Rio Yaque del Norte on road from Monte Cristi to Dajabon, in province of Monte Cristi, Dominican Republic, to consist of 2 rein. concr. cantilever arches of 100 ft. span each, 2 cantilever concr. approach spans of 42 ft. each and 2 approach fills each 200 ft. long, over all length, 314 ft. and out width 18 ft. 9 in.—A. J. Collett dir. gen. pub. wks., Dominican Republic.

EQUIPMENT BARGAINS

Bulletin No. 270—60 pages—is a
SURE MONEY SAVER
Get it—before buying
Contractors' Equipment, Cars, Rails, Mixers, Engines, Piling, Pipe, Bridges, Tanks.
ZELNICKER IN ST. LOUIS

FOR SALE
Second hand Chicago Cube Concrete Mixer, size 22; complete with engine and boiler.
S. V. H., care of
MUNICIPAL JOURNAL AND PUBLIC WORKS
243 W. 39th St., New York City

MISCELLANEOUS.

Ala., Bridgeport. **2 p.m., Jan. 2.**
Lock and esplanade for dam at Widows Bar, Tennessee river near here—U. S. Engr. Office, Florence.

D. C., Washington **10.30, Dec. 17.**
Furnishing motor generator sets, starting compensators, switchboard, oil-pumping plant, garbage cans, iron lamp posts, silica sand, pig lead, etc.—A. L. Flint, Gen. Purch. Officer, Panama Canal, Washington, D. C.

Ind., Fort Wayne. **2 pm, Dec. 13.**
Ditch in St. Joseph twp., Allen co.—R. J. Mourey, supt. constr.

Ill., Wheaton. **7.30 pm, Dec. 15.**
2 drain impvts., involving 8 to 30-in vitr. pipe—LaVerne J. Ruddock, city engr.

The 100% Advertising Medium for Bids for Public Work

This is the only **weekly** devoted exclusively to public work.

Highways, streets, waterworks, water purification, sewerage, sewage disposal, bridges, irrigation, garbage disposal, fire protection.

It published nearly double as many contract news items regarding such work as any other paper.

And it is read **first** by contractors who specialize in public work. The circulation is national.

Rates for proposal ads—$2.00 an inch.

Municipal Journal & Public Works

243 West 39th Street, New York

BIDS ASKED FOR

Ind., Rochester **2 p.m., Dec. 24.**
Ditch in Fulton County.—A. V. Oliver, Contr. Comr.

Ind., New Castle. **2 pm, Dec. 20.**
Ditch in Henry co., involving 2.771 cu. yd. excav., 2,175 ft. 18-in., 1,500 ft. 14-in., 1,360 ft. 12--in., 840 ft. 10-in., 1,729 ft. 8-in. tile—W. S. Freel, surv., Henry co.

Minn., Elbo Lake. **10 am,J an. 7.**
C'eaning and repairing co.; ditch no. 8, involving 14,500 cu. yd. excav.; c'earing and grubbing trees and brush; and repairing bridge foundation—C. M. Nelson, co. aud., Grant co.

Mo., St. Louis. **11 am, Dec. 26.**
456,000 cu. yd. earthwork (327,000 cu. yd. hydraulic fill in old borrow pits, and 123,000 cu. yd. levee enlargement) in Sny Island Levee Drainage Dist., Ill.; also 260,000 cu. yd. earthwork (172,000 cu. yd. hydraulic fill in old borrow pits and 88,000 cu. yd. levee enlargement) in Hunt Drainage Dist.—Secy., Mississippi River Comn., 1311 Internat'l Life bldg.

N. Y., New York. **10.30 am. Dec. 18.**
Furnishing lubricating oils and greases, wood paving blocks, etc.; also kerosene and gasoline, cement and clay, etc., to various depts.—Bd. purchase, municipal bldg., Manhattan.

N. Y., Albany. **3 pm. Dec. 15.**
Collection, removal and disposal of garbage in 3 dists.; removal of dead animals, etc., in 1920—I. Wachsman, secy., bd. contr. and supply, city hall.

N. Y., New York. **10.30 am. Dec. 16.**
Motor trucks and motor cars to dept. street cleaning—Bd. Purch, municipal bldg.

N. Y., New York **10 30 a.m., Dec. 11.**
Furnishing springs for ash and paper carts, booms for ash and paper carts; vehicles (motor cycles, bicycles, patrol wagons, trucks, police box body, runabouts), paper and rubbish trucks, canvas covers, wagon wheels, etc.—Bd. Purchase, Municipal Bldg., Manhattan.

N. Y., Albany. **noon, Dec. 23.**
Work on barge canal terminals, involving furnishing and insta"ing four 3-ton electric semi-portal revolving jib cranes on barge canal terminals, 2 each at Greenpoint—E. S. Walsh, supt. pub. wks., Capitol.

Pa., Hollidaysburg. **Dec. 17.**
Furnishing one tractor—T. W. Tobias, contr. Blair co.

Pa., Philadelphia. **Dec. 17.**
Two 5-ton hammer head cranes—Bureau of Yds. & Docks, Navy Dept., Washington.

S. C., Charleston. **Dec. 10**
830 ft. quay wall.--Bureau of Yds. & Docks, Navy Dept., Washington, D. C.

S. C., Paris Island. **Dec. 17.**
361 and 181 ft. concr. walls, 6 ft. and 3 ft. high—Bureau Yds. & Docks, Navy Dept., Washington, D. C.

Tex., Aspermont. **Dec. 15.**
160 ft. steel truss span bridge over Salt Fork of Brazos river, 18 ft. wide, including rein. concr. pier, plain concr. abutment and wooden flooring—F. L. Hargett, Haskell, engr.

Utah, Hinckley. **10 am Dec. 20.**
Furnishing and laying 281,000 lin. ft. drain tile; excavating and backfilling 281,000 lin. ft. drain tile trench; excavating 106,000 cu. yd. for open ditch, etc. in Millard co.—Co. supervr.

Va., Norfolk. **Dec. 17.**
One 5-10 ton hammer head crane—Bureau Yds. & Docks, Navy Dept., Washington, D. C.

Wash., Seattle. **noon, Dec. 19.**
Dredging and rock excav. in Wapa river and harbor, Wash.—U.S. Engr. Office.

W. Va., Wheeling. **Dec. 26.**
Furnishing and erecting lock gates for dams in Ohio river—U. S. Engr. Office.

Wis., Portage. **Dec. 17.**
Straightening and deepening Baraboo river from Butterfield bridge to river mouth, involving 400,000 cu. yd. excav., 3 mi. new cut, 40 ft. wide at bottom, 13 ft. deep, etc.—H. V. Tennant, engr.

ROADS AND STREETS

Ala., Mobile—Plans to issue $25,000,000 bonds to match fed. appropriation for building roads were set on foot.

Cal., El Centro.—Imperial co. voted $150,000 bonds to build 35 miles road from El Centro to San Diego. $150,000 additional bonds will be voted on for Mecca-Los Angeles rd.

Cal., Grass Valley.—Cost of completing city's paving program is $27,000. This provides for concr. roadway from south city limits to asphalt paving at Main st. and Mill st. A macadam roadway from Neal to Main st. is also provided for.

Cal., Pomona.—Election planned on $300,000 bonds for paving, etc. City clk.

Cal., Yuma City.—$730,000 hwy. bonds have been awarded by Sutter co.

Conn., Suffield.—City appropriated $25,000 for new macadam pavements on various streets.

Fla., Bunnell.—Davies-Bertram co. awarded Haw Creek Special road and bridge bonds for $250,000 in Flagler co.

Fla., Lake City.—Bids received until Jan. 6 by bd. comrs. of Columbia co. for $500,000 road constr. bonds. J. A. Leslie, chn.

Fla., Panama City.—Election will be held on issuance of $132,000 municipal bonds for paving streets.

Fla., Titusville.—Bd. comrs of Brevard co. will order election to vote on $300,000 for roads.

Ill., Chicago—$28,600,000 bond issue carried. Most costly project is extension and widening of north and south Robey St., on west side, at $9,200,000. Ashland Ave. work will cost $5,800,000; Ogden Ave., $5,400,000; and Western Ave., $2,400,000.

Ind., Anderson.—City will receive bids until Dec. 17, on hwy. impvt. bonds. $70,600.

Ida., Moscow.—Potlatch hwy. dist. voted in favor of bonding dist. for $350,000.

Ia., Spencer.—Bond issue of $800,000 for paving is voted in Clay co. Vern McCown, engr.

Kan., Ft. Scott.—Bourbon co. having plans prepared for paving, grading and building bridges on 9.18 mi. Kansas City Rock rd., 16 ft. wide, bituminous macadam. $250,000. B. Boyle, engr., Fort Scott.

La., Bienville.—City sold $1,000,000 worth of bonds for improving roads.

La., New Orleans.—City will receive bids Dec. 29 for $1,600,000 paving certificates. A. G. Ricks, comr. pub. finances.

Md., Baltimore.—Hwy. Engr. G. F. Wieghardt authorized by bd. estimates to use $34,000 for repairs to streets.

Mo., Troy.—Lincoln co. voted $800,000 bonds to build hard surfaced roads.

Mich., Baldwin—Lake co. supervrs. and co. rd. comr. have decided to build 10-mi. rd. which will connect Luther and Peacock.

Mich., Gladwin—Gladwin Co. soon lets contract for shaping, draining, surfacing and gravelling 6.443 mi. state trunk line in Tobacco Twp. $70,000.

Mich., Ironwood.—Gogebic co. comrs plan to constr. 88 mi. rd. next year. $420,000. J. Luxmore, Jr., co. aud.

Minn., Crookston—Polk Co. commissioners carried $250,000 bonds for constructing roads in 1920.—H. J. Welte, Co. Aud.

Minn., Jackson—Jackson Co. commissioners voted $700,000 road bonds. $100,000 federal aid to be added—P. D. McKeller, Co. Aud.

Minn., Minneapolis.—Hennepin co. having surveys made for paving 5 mi. Excelsior ave. 24 ft. wide, concr. or vitr. brick. $125,000. E. E. Terrell, co. surv.

Minn., Minneapolis—Paving amounting to $1,000,000 is planned for 1920.

Minn., Minneapolis—Bd. Park Comrs. voted $937,444 for improvements in parks and boulevards adjacent to Lake of Isles and Lake Calhoun. T. Wirth, Supt. Parks.

Minn., St. Paul—Order introduced in council provides for paving Arcade St. next year. County contemplates paving St. Paul and Duluth Hwy. from City to White Bean.

Miss., Purvis.—Bd. comrs. of Lamar co. will constr. 30-mi. gravel rd.; $200,000 available. Chairman.

Mo., Lebanon—Laclede co. citizens voted $100,000 bonds for good rds. in Lebanon special rd. dist. no. 1. It is planned to constr. 20.000 mi. hwy.

Mo., Monticello.—Lewis co. plans to build 5. 5-mi. gravel rd. from Monticello to Lewiston; cost $55,000; also 6-mi. rd. from Monticello to North Canton, $60,000; both 16 ft. wide.

Mo., Savannah.—Andrew co. and Nodaway co. plan to build 50-mi. hard-surface rds. from Iowa line to Buchanan co., 18 ft. wide. Leslie-Barnes Engr. Co., engrs, Amer. Natl. Bank bldg., St. Joseph.

Mo., Springfield.—It is planned to issue $2,000,000 bonds for rds. in Greene co., address co. surv.

Mo., Trenton.—Trenton twp. approved $135,000 bond issue to hard surface rd. across twp. Planned to improve by grading 20-mi. rd. at cost of $20.000.

Neb., Norfolk—It is planned to spend $600,000 for paving streets during 1920. L. H. Doughty, city engr.

Nla., Burlington.—Illinois hwy. comn. announced that Route 8, of bond issue system, between Peoria and Burlington has been definitely decided upon.

N. Dak., Bismark—Contracts for 600 mi. highway will be awarded early in 1920. Cost between $1,500,000 and $2,000,000.—J. E. Kaulfuss, Ass't. State Hwy. Engr.

N. C., Whiteville—Columbus County plans election on $1 000,000 bonds to improve 1,400 mi. public highways.

N. C, Clinton—It is planned to spend $150,000 for asphalt paving on several streets. Address, City Clk.

O., Canton.—List of 25 streets to be paved was submitted to council.

O., Dayton.—Pending approval of state hwy. dept. road-building program for 1920 will include paving 28 mi. state and co. roads. Total cost of impvt. $850,000.

O, Defiance.—Among contemplated rd. impvts. in Defiance co. are following: Hicksville Bryan rd. 11 mi. Hicksville Newville to Indiana state line; Auburn Defiance rd. to Farmer; Bryan Paulding rd. 9 mi., 5 mi. north to Williams.

O., New Lexington.—Perry co. will have $75.000 for constructing rds. next year.

O., Sidney—Co. Surv. ordered to prepare plans for improving following roads: Lochard road No. 31, Dinsmore Twp.; Montra road No. 30, Dinsmore and Jackson twps.; Kettlerville-Jackson Center road No. 21, Jackson Twp.; Wones road No. 28, Jackson Twp.

O., Xenia—Engineer K. Riddle, city hall, is preparing plans for $140,000 worth of paving, sewers and curbing. Bids will be advertised shortly.

Okla., Ardmore.—Carter co. to vote on $640,000 road bonds.

Ont., Hamilton.—Special rd. extension comn. of Wentworth co. council recommended that 50 mi. be added to county's rd. system.

Ont. Toronto.—Works committee approved constr. of asphalt pavement on Gerrard st. to cost $182,441; also sanctioned 24-ft. asphalt pavement on 5-in. concr. foundation on Swanwick ave. to cost $36,720.

Ore., Portland.—City proposed to spend $88.879 in 1920 for streets and sidewalks.

Ore., Prineville.—City voted in favor of $220,000 bond issue for improving rds. in Crook co.

Pa., Beaver.—$975,000 bonds for rds in Beaver co. has been awarded.

Pa., Greenburg.—Co. comrs. took action on petitioning state hwy. dept. for rd. impvts. in borough of New Florence. Length of road, 3,200 ft. Road supervrs. of St. Clair twp also petitioned co. comrs. for 35,000 ft. improved hwy.

P. Q., Quebec.—It is planned to spend $10 000.000 for roads in this province. Address Provincial Roads Dept.

R. I., Newport.—Bids received until December 11 for $40,000 coupon road improvement bonds.

S. C., Sumter.—$1.000.000 bonds for rd. impvts. in Sumter co. centemplated. Address co. clk.

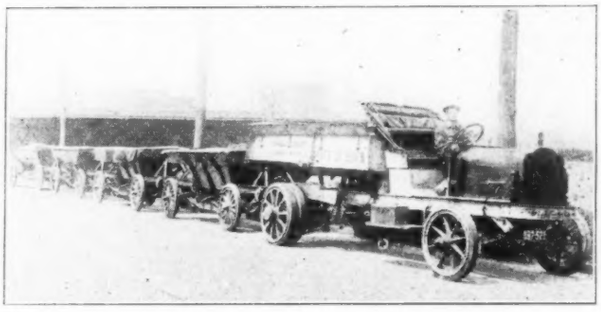
LEE LINE

In Indianapolis

IT COSTS ONLY
54 CENTS PER CUBIC YARD

For Garbage and Ash Collection

This figure includes salaries of superintendents and men, gasoline, repairs, interest and depreciation on investment, garage and all other costs chargeable against collection.



It represents a vast saving over the old horse and wagon method, besides increasing the frequency of pick-ups and making for a cleaner and more healthful city.

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Hauled in trains by tractors is the solution of the wastes collection problem.

If it is a Trailer, Semi-Trailer, Motor Truck or Trailer Body or special handling or hauling equipment—we make it.

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Builders of Automotive Auxiliary Equipment
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The car measures 55 feet over all. The plant is easy to dismantle and set up. Has extra large hot-material bin and large mixer. Two melting kettles—a day's run in each. Each unit can be operated separately.

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Good engineers are specifying steam melted asphalt because it is absolutely safe; gives better results and lasts longer. The steam melting system also saves money for the contractor because it makes it impossible to burn or coke the asphalt or burn the kettle bottoms. The complete plants are built in our factory by skilled mechanics—built to do real work and keep on the job always.

Write for folders giving capacities and full information.

East Iron & Machine Company, Lima, Ohio

Tenn., Pulaski—Giles Co. court will receive bids until Dec. 27 for $150,000 highway bonds.—R. H. Harris, Clk.

Tex., Beaumont.—$2,000,000 rd. bond issue contemplated in Jefferson co. Address W. M. Carroll, co. judge.

Tex., El Paso.—Issue of $200,000 street improvement bonds voted. Address W. C. Stewart, city engr.

Tex., Edinburg—Election on $2,500,000 bonds for road improvement in Hidalgo Co. contemplated. Address, G. P. Brown, Co. Judge.

Tex., Hondo—Election on $800,000 road bonds contemplated. Address, R. J. Noonan, Co. Judge, Medina Co.

Va., Norton.—Wise co. contemplates

Va., Norton.—Wise Co. contemplates building road from Appalachia to Lynch, Ky.; $100,000.

Va., Roanoke—$950,000 bond issue for improvements to streets, sewers, etc., carried.

Wis., Chilton.—Calumet co. will constr. 6-mi. concr. rd. in 1920. Wm. Conway, engr., Green Bay.

Wis., Crandon.—Forest co. rd. program for 1920 calls for outlay of $27,472.57, principally grading. F. J. Rogers, comr.

Wis., Madison—Iron Co. plans improvement to Hurley-Kimball road with gravel surfacing; $3,465.40, Wm. Weber, Saxon. Price Co., Fifield road, ditching and graveling, $4,684.80. Flambeau road, grading and ditching, $7,432.75. B. M. Griffin, Phillips, Wis.

Wis., Madison.—Dane co. will issue $10,000,000 bonds for good rds.

Wis., Madison.—Following rd. constr. will be undertaken in 1920: Pierce co., town of River Falls, grading and surfacing, $16,500, also grading, draining and surfacing in several towns amounting to $20,655. C. K. Kenall, comr., Ellsworth. Crawford co., grading and draining, 3 bridges and, 2 culverts to cost $800, total $25,250. J. M. Campbell, comr., Bell Center. Ashland co. will spend $34,543. W. E. Dillon, comr., Highbridge. Vernon co., Readstown, bridge costing $18,000. Grading, draining and culverts, $44,528.62. A. Riston, Viroqua. Sawyer co., $6,825.28. E. J. Collette, Hayward.

Wis., Stevens Point.—Expenditure of $1,500,000 for 75 mi. concr. rd. in Portage co. contemplated. Address co. hwy comrs.

Wis., Waukesha.—Waukesha co. bd. will consider $3,600,000 bond issue for system of roads. Concrete preferred. C. J. Hahn, co. hwy. comr.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

***Ga., Savannah**—Louisville road contract awarded Lawrence Constr. Co. of Augusta by Comrs. for $373,000, including road and bridges. Concr. constr.

***Ind., Anderson**—Madison Co. Comrs. disposed of following: Contract for construction of Kaufman concrete road at $21,200 to Madison Construction Co., Anderson; construction of Tree concrete road at $46,790 to Daniels & Lyst, Anderson.

***Ind., Indianapolis**—Illinois street, from Mobile to South, asphalt roadway, to Indiana Asphalt Paving Co., at $27,700 total.

***Ind., Versailles.**—Central States Constr. Co. won contr. for building 5-mi. rd. between here and Osgood. $223,151.68.

Kan., Wellington—Bids received by Sumner Co., Dec. 3, for concr. constr., 18 ft. wide, 5 ft. earth shoulders on each side, including grading and all culverts: Cook & O'Brien, Sect. A, $52,171.60 per mi., for slab alone, $41,411.65; Sect. B—$47,969.07 per mi.; Sect. X—$52,281.78 per mi. Merydith Constr. Co., Sect. A—$45,803.16 per mi., for slab alone, $24,158.92; Sect. B—$42,532.45 per mi.; Sect. X—$49,531.96. DuBois Constr. Co., Sect. A—$42,879.72 per mi., for slab alone, $34,158.92; Sect. B—$41,308.75; Sect. X—$44,563.31. Pine Grove Constr. Co., Sect. X—$49,683.75 per mi., for slab alone, $42,374.42.

***Mich., Lansing**—Following contracts awarded by state highway department: Menominee Co. Comrs., Menominee, 2.95 mi. B gravel road at $46,355.09; Menominee Co. Comrs., Menominee, 1.478 mi. B. gravel road at $21,885.34; J. P. O'Rourke, Ewen, 2.5 mi. A-stamp sand road, at $10,500.

***N. J., Atlantic City.**—City comrs will award contr. Dec. 11 to Matthers Bros., Red Bank, for impvts. to Absecon blvd. at $84,000.

N. Y., Albany.—Following bids received by State Hwy. Dept.: Rd. no. 1521, Rensselaer co., 144 mi., Belmar Contracting Co., Inc., Troy, $43,507.75; L. Mayersohn, Albany, $46,270.75; engr.'s est., $43,795.25. Rd. no. 1527, Rensselaer co., 1 ⅞ mi.—Belmar Contg. Co., Inc., $41,906.75; engr.'s est., $42,056.25. Rd. no. 1528, Saratoga co., 4.17 mi.—J. B. Dower Ballston, Spa, $167,257; J. J. Gunnar Contg. Co., Inc., Brooklyn, $171,156. Rd. no. 1117, Saratoga co., 6.10 mi.—W. G. Fox, Saratoga, $94,109; A. A. Parker, Waterford, $95,437. Rd. no. 5651, Jefferson co., 4.78 mi.—J. S. Smith & Son, Lyons Falls—$144,127.75; engr.'s est., $155,963.25. Rd. no. 1450—A. Broome co., 6.93 mi.—Rosoff Engr. Co., N. Y. C., $304,874; engr.'s est., $305,472.50. Rd. no. 1428, Oswego co., 6.36 mi.—J. D. Rust, Buffalo, $95,405.24; J. Johnson Constr. Co., Buffalo—$96,984; W. J. Semper, Watertown, $104,604.21; engr.'s est., $99,069.66. Rd. no. 1267, Wyoming co., 6.99 mi.—F. W. Knickenberg, Buffalo, $130,388.68; engr.'s est., $134,788.68. Rd. no. 5650, Steuben co., 2 mi.—Sweeney & Boland, Rochester, $56,369.90; W. Slocum, Greenwood, $59,044.38; A. A. Howard, Fairport, $62,042.08.

***O., Dayton.**—Finke Engrg. Co. has been awarded contr. for paving West Third st. with brick at bid of $47,109.50.

***Utah., Salt Lake City.**—2 paving contracts awarded J. W. Mellen by city comn. Paving Sixth South at $10,061.17; preliminary est., $10,268.98. Paving First West and Wall sts. at $209,521.72, about $2,000 over city engr.'s est.

***Wash., Mt. Vernon.**—Skagit co. comrs. awarded contr. for second section of rd. from Forest Home Academy to Bid Lake rd. to Herbert Horne for $19,000. Work includes clearing, grubbing and culverts.

SEWERAGE AND SANITATION

Ala., Gadsden.—City issued $90,000 bonds to build sewers and electric distribution system. E. Smith, city engr.

Me., Portland.—S. N. Bond & Co., Boston, were successful bidders for $35,000 sewer notes.

Minn., Duluth.—Will receive bids until Dec. 22 for $100,000 sewer bonds.

Neb., Crete.—City plans to build storm sewers in various streets. $73,000.

Ore., Bend.—City voted $133,000 bonds to build sewerage system, cement or vitr. pipe. R. B. Gould, city engr.

Ore., Portland.—City proposes to spend $125,012.75 for sewer constr. in 1920.

Okla., Guymom.—Vote Nov. 19 on issuing sewer system bonds of $60,000.

Wis., Marion.—City plans to excavate and lay 2 to 3 mi. vitr. pipe sewer in various streets and install sewage disposal system. $50,000. L. P. Pelishek, engr., Clintonville.

Conn., Derby.—City appropriated $33,000 to extend sewerage system.

Mass., Milbury.—City of Worcester plan to build sewage disposal plant here. $250,000.

N. C., Gastonia.—City plans to constr. sewage disposal plant and extend sewerage system and water works. $100,000. W. M. Platt, engr., Durham.

O., Canton.—Sanitary sewers to be laid in 12 streets and storm sewers in 19 streets, during 1920.

O., Medina.—Vil. plans to build sewerage system and sewage disposal plant. G. Gascoigne, engr., city hall, Cleveland.

Fla., Panama City.—City will vote $18,000 bonds for constructing sewers.

Miss., Senatobia — $15,000 bonds for constructing sewers voted; $25,000 voted previously. Harper Johnson, city clk.

Ida., Malad.—City will build sewers in impvt. dist. no. 2. Cost, $16,000. J. J. Evans, clk.

Ida., Rupert.—City will sell $30,000 bonds to extend present sewerage system to include installation of vitr. or cement branch and service pipes. A. Kelset, engr.

Ind., New Castle.—Drainage Comr. of Henry co. will receive bids for constructing Walter M. Pearce drain which requires 17,066 ft. tile, 5,048 cu. yd. excav. Otto I. Sanders drain, requiring 14,496 ft. tile, from 6 to 16-in will be offered for sale in Jan., 1920.

N. Y., Fredonia.—Constr. of adequate sewer system and disposal plant contemplated. Address pres., bd. trustees.

Okla., Chandler.—Sewer extension costing $35,000 is planned. Clk of council.

Pa., Franklin.—City having surveys and reports made by M. Knowles, engr., Jones Law bldg., Pittsburgh, for complete sewage disposal plant. $200,000.

Tex., Houston.—$500,000 bond issue authorized for sewer system. City clk.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

***N. Y., Niagara Falls.**—Dominick Spacone was awarded four contracts for sewer constr. as follows: Sewer in 14th st., $2,953.83 in alley between 11th and 12th sts., $1,820.35; in alley between 9th and 10th sts., $2,412.92, and sewer in alley between 9th and 10th sts., $2,451.10.

WATER SUPPLY

Conn., East Hartford.—Voters of fire dist. authorized $400,000 bond issue for water system. Supt. water works.

Conn., Groton.—Citizens voted $100,000 for extending water system. L. Brogan, clk.

Ia., Quimby.—City drawing plans for improving water works, $16,000. C. C. H. Currie, engr., Webster City.

Ia., Woodward.—Plans for new supply for water system under way. Evinger Engr. Co., 222 Davison bldg., Des Moines.

Md., Elkton.—To. comrs plan to build filtration plant and enlarge water mains. $65,000. L. H. Houston, Jr., 608 Parkwyrth ave., Baltimore, engr.

Mass., Palmer.—To. plans to install water system. $250,000.

Mich., Bessemer.—Two water reservoirs, 200,000 and 500,000 gal. capacity, respectively, will be built next spring. Electric pumps with 1,500 g. p. m. capacity will be installed in new pumping station. Cost $175,000.

Mich., Lansing.—City retained Alvord & Burdick, engrs., Hartford bldg., Chicago, to prepare plans and estimates for proposed filtration plant.

N. J., Glen Ridge.—City considering plan to install municipal water plant. Mayor, H. S. Babbage.

N. J., New Brunswick.—Bids received Dec. 16 on water bonds of $161,000 and $183,000 general impvt. bonds.

N. J., South Amboy.—First Natl. Bank of South Amboy was successful bidder for $75,000 water bonds.

N. Y., Stamford.—Water Co. decided to purchase land for constr. of storage reservoir of 300,000 gal. Address secy. of company.

N. Y., Tonawanda.—Special election on bond issue of $300,000 for filtration plant. Chn., bd. pub. wks.

N. C., Asheville.—Bd. comrs. authorize bond issue of $350,000 for extending and improving city's water supply.

N. C., Franklinton.—$93,000 bond issue for water and sewer systems has been authorized. City clk., G. L. Cooke.

O., Akron.—Council considering another bond issue of $685,000 for extending water works.

O., Dayton. — Proposed reservoir for west side to cost $175,000 and have capacity of 10,000,000 to 15,000,000 gal.

O., Cleveland.—City council passed ordinance to spend $25,000 for improving water supply system.

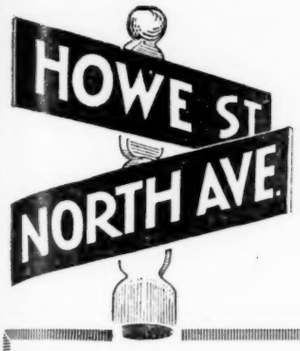
O., Cleveland.—City having preliminary plans prepared for building filtration plant, 160,000,000 gal. capacity. $5,000,000. R. Hoffman, city engr.

O., Mansfield.—Water works and pipe line costing $30,000 to be constructed. C. C. Reid, clk.

Okla., Hominy.—Water works impvts. have been decided upon. C. E. Lee, engr.

Ont., Forest.—Report submitted by E. A. James Co., Ltd., Toronto, on water works system to cost $62,000, including mains, pumps, water tower and deep well. Council to submit same to people, Jan. 1920.

Ont., Toronto.—Works Comr. Harris reported to Bd. Control that it will be necessary to replace four of the electri-



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cally driven pumps which supply city with water. Cost $75,000. Tenders will be called.

Ore., Ashland.—City council having plans made for 25,000,000 gal. concrete reservoir on east fork of Ashland creek, cost $20,000,000; also plans to install water meters throughout residential district.

Ore., La Grande.—City plans to develop water system. $5,000,000. P. Cupper, state engr., Salem.

S. Dak., Willow Lake.—City is to vote on $75,000 water works bonds.

S. Dak., Willow Lake.—Special election called to vote on issuing $75,000 water works bonds.

Wash., Anacortes.—Resolution introduced in council providing for installation of 10-in water main along certain streets. Cost $12,000. City engr. preparing plans.

Wash., Anacortes.—Council passed resolution for first step in giving city improved water system. Cost of impvt., $12,000.

Wash., Tacoma.—City plans to build concrete reservoir 140,000-gal. capacity, on Wapato Hill. $175,000.

W. V., Grantville.—C. E. Witt, mayor, states plans have been prepared for water works plant. Contr. to be awarded in spring.

Wis., Cedarburg.—Co. comrs. plan to spend $175,000 in constructing water and sewer systems in town. J. Bichler, co. aud.

Wis., Milwaukee.—Plans are matured for filtration plant at foot of Linwood ave. $3,000,000. City engr.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

***Tex., Port Arthur.**—City comn. awarded contr. to Pittsburgh Des Moines Co. at Dallas for constr. of elevated water tank of 300,000 gal. capacity for $24,000.

LIGHTING AND POWER

Ia., Marshalltown.—Minerva Electric Co. contemplates constr. of electric line from Minerva, 2½ mi.

Ia., Massena—City contemplates construction of municipal electric light plant.—C. W. Stoker, Vil. Clk.

Ia., West Liberty—Town will vote on $38,000 bond issue for municipal electric light plant.—J. Atkins, Town Clk.

Kan., St. Francis—$55,000 bond issue for electric plant is carried.—F. L. Shields, City Clk.

Mich., Kalamazoo—City voted $1,260,000 electric light bonds.

Mich., Ypsilanti.—City council will take action on proposed ornamental lighting system for city. Plans drawn contemplating installing 126 lamps of 600 c. p.

Minn., Benson—Plans being made for imprvts. to electric light plant. W. E. Skinner, engr., Minneapolis.

Miss., Lexington.—City will sell $20,000 electric light plant bonds. W. W. Wilburn.

Neb., Prague.—Vil. clk., Alton Kaspar, states that he will receive bids Dec. 20 for $12,000 electric light bonds.

Neb., Scribner.—Lighting problem will be solved through organization of company toward which $40,000 has been subscribed, company will install plant to furnish light.

O., Cleveland.—City council adopted ordinance to spend $50,000 for lighting system in parks and blvds.

O., Hamilton.—Council passed ordinance for $50,000 bond issue for improving and developing city electric light plant and distributing system. J. J. Sloat, serv. dir., announced work would begin as soon as legislation passed.

Okla., Norman—City is to vote on $125,000 electric light plant bonds.

Ore., Astoria—Port Comm. plans to install underground electric power system through port property, including concrete transformer house. $17,000. R. R. Bartlett, Engr.

S. Dak., Wakonda—Wells-Dickey Co., Minneapolis, Minn., recently purchased $20,000 electric light bonds.

Wis., Green Bay—City having plans prepared for ornamental lighting system in business streets. $20,000. Vaughn & Meyer, Security Bldg., Milwaukee, Engrs.

FIRE

Cal., San Pedro—Question of organizing fire department and fire apparatus is under consideration at Chamber of Commerce.

N. J., Harrison—Ordinance passed providing for $25,000 bond issue for fire department.

Pa., Cooperburg.—$16,000 bond issue for apparatus is ordered. Address clk.

Pa., Hazleton—A chemical engine, aerial truck and triple auto engine will be bought for fire companies with part of proceeds of $500,000 loan recently approved.

Pa., Lee.—Erection of $40,000 fire dept. headquarters and installation of $150,000 fire alarm system will be petitioned by pub. safety dept.

Wis., La Crosse—City to take bids at once on motor trucks for fire department. Council passed ordinance bonding city for $40,000.—M. Birnbaum, City Clk.

BRIDGES

Cal., Sacramento.—State hwy. comn. has ordered that flooring of rein. concr. bridge, built by Colusa co., be surfaced with bituminous material.

Fla., West Palm Beach.—$250,000 bonds for constructing bridge over Lake Worth was voted. Chn. bd. comrs. of Palm Beach co.

Kan., Kansas City.—City will constr. 800-ft. approach across Kaw river to connect industrial dists. of Kansas side and Argentine.

Mich., Detroit—Plans for two-deck suspension bridge over Detroit river at cost of $28,000,000 under consideration.

N. J., Trenton.—Plans being prepared for 2 bridges on river road near Scudders Falls. Address co. engr., Passaic co.

O., Batavia—Batavia co. voted $25,000 bonds for building ad repairing bridges.

O., Cleveland—City council adopts ordinance to spend $15,000 for bridge in W. 117th street.

S. C., Converse.—Bridge will be constructed over Pocolet river; 400 ft. long; concr. to cost $45,000. State hwy. dept., Columbia.

Utah., Salt Lake City.—Bridge to be constructed across Grand Canyon of Colorado at $100,000.

Wis., Madison.—State hwy. dept. is preparing plans for bridges as follows: Buffalo co., Weinandy bridge in Belvidere, 12x24 rein. concr.; J. Reinhart, Nelson. Monroe co, Lamb bridge in La Grange, 30x24, rein. concr.; C. H. Millard, Sparta. Jackson co., Tucker bridge in Jalbion, 16x20, concr., Wm. Tibbetts, Black River Falls. Crawford co., 2 bridges, rein. concr., J. Campbell, Bell Center. Oconto co., 9 bridges. P. Peety, comr., Oconto. Adams co., Witches Gluch bridge in Dell Prairie. 10x24, rein. concr., J. A. McGregor, Friendship. Waushara co., Birch creek bridge in Wautoma. 12x24 ft., rein. concr., F. Grimm, Wautoma.

Wash., Walla Walla.—Co. comrs. sold $115,000 bridge bond issue to Union Trust Co.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

***Mich., Lansing**—Sarnia Bridge Co., Sarnia, Ont., awarded contr. for bridge over Bad river, Saginaw co., $10,173.80. J. Decker, Rogers City, State Trunk Line bridge in Presque Isle co., $7,500.

MISCELLANEOUS

Cal., Merced.—Proposition for formation of Merced Irrigation Dist. to cost from $5,000,000 to $6,000,000 carried in Merced co.

Fla., De Funiak—City Clk. Duncan Gillis receives bids until Dec. 23 for $65,000 various bonds.

Ga., Savannah—City considering issue of $350,000 market bonds.

Miss., Greenville.—City will buy street sprinklers and flushers, both motor and horse driven. Address Guy Drew, city clk.

N. J., East Orange.—Water Comn. and City Council considering plan of erecting garbage incinerator in Livingston. Cost $100,000.

O., Cleveland—City council authorized expenditure of $140,000 for construction and equipment of two public baths.

Ore., Portland.—City will have 15,000-ton dry-dock, consisting of 5 pontoons of 3,000-ton capacity each. Total cost from $750,000 to $900,000.

Pa., Pittsburgh.—Council of Tarentum borough will receive bids until Dec. 22 for $35,000 park bonds. W. S. Robinson, borough secy.

Wis., Madison.—Several cos. made appropriations for purch. of rd. machinery as follows: Trempealeau co., 2 large graders and gravel pit equipment, $19,000. E. F. Rotering, Arcadia. Winnebago co., 1 paver and pipe line and 3 patrol graders, $15,000. J. Binning, Oshkosh. Lincoln co., 16 patrol graders, 12 wheelers, 1 grading outfit, $19,000, H. H. Kuehling, Tomahawk.

Wis., Madison.—Richland co. appropriated $8,000 for purchase of rd. machinery, including heavy tractor and grader. M. O. Carter, Richland Center, comr. Dunn co. appropriated $9,000 for machinery, including stone crusher,etc. F. Stewart, Menominee, comr.

Wis., Madison.—Many cos. have made appropriations for purchase of machinery: Barron co., 1 screening plant, 2 trucks; 1 tractor and grader, 1 constr. outfit, $50,000; Ed Gleason, Cumberland. Wood co., $20,000 for machinery; Grant co., graders, plows, 31 road drags, $16,000. F. Mink, Lancaster. Oneida co., $15,000. Clark co., crushers, bins, small graders and tools, $12,000; W. C. Thomas-Neillsville. Juneau co, $10,000. Taylor co., $10,000; F. H. Grahl, Medford. Vernon co., scarifier, compressor, oiler tractors. $10,000; A. Ristow, Viroqua.

TOO LATE FOR CLASSIFICATION

STREETS AND ROADS.

Ala., Montgomery.—Election Feb. 16 on $250,000,000 state hwy. bonds, state treas.

Fla., Arcadia.—De Soto co. plans election soon to vote on $110,000 road bonds.

Fla., Okeechobee—City clk., W. W. Dunicliff calls for bids Jan. 14 for $125,000 street paving, water works and sewerage bonds.

Ga., Carrollton.—Comrs. Carroll co. having plans prepared and receive bids about Jan. 1 for 115 mi. sand clay road. $500,000. J. L. Zachery, 210 Spring st., Atlanta, engr.

Ill., Peoria.—$1,750,000 bond issue will be submitted to Peoria co. for improving 91 mi. co. road.

Ia., Corydon—Wayne co. is surveying roads to be paved. $100,000. H. Morret, aud.

La., St. Francisville.—Issue of $250,000 bonds voted for gravel roads in West Feliciana parish. Address police jury.

Minn., Stillwater.—Petitions circulated in Washington co. for special election to issue $500,000 road bonds.

N. Mex., Roswell—Amer. Natl. Bank of Oklahoma awarded $100,000 road bond issue of Chaves co.

N. C., Burnsville.—Issue of $500,000 road bonds will be sold. Yancey co. clk.

O., Canton—Bids received by bd. Stark co. comrs. on $44,000 bonds for North Lawrence-Canal Fulton road impvt.

O., Cincinnati.—Planned to improve Cincinnati-Louisville rd. and sects. A and B of Harrison pike in Hamilton co.; ests., $226,000, $159,000 and $103,000, respectively. Address co. surv.

Pa., Harrisburg.—City having plans prepared by M. B. Cowden, city engr., for paving Cameron, Herr, 19th and Front sts., Bellvue rd. and other short sections. $50,000.

Va., Covington.—Paving various street is contemplated. $100,000. T. B. McCaleb, mayor.

Wis., Whitehall.—Trempealeau co. bd. voted $210,000 for stretch of permanent hwy. known as Whitehall-Ettrick rd. E. Rotering, co. hwy. engr.